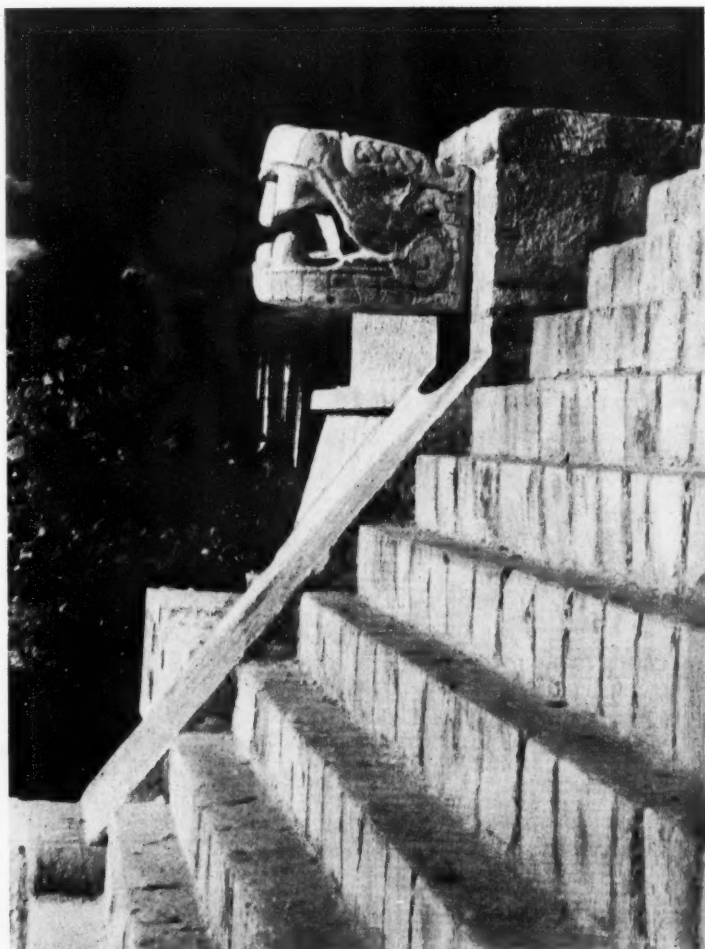


THE ARCHAEOLOGICAL PROBLEM OF THE MAYA: THE TEMPLE OF THE WARRIORS: RESTORATION OF THE TURQUOISE MOSAIC PLAQUE: THE BAS-RELIEFS FROM THE TEMPLE OF THE WARRIORS: THE TEMPLE OF THE WARRIORS MURALS: THE FIELD MUSEUM-OXFORD UNIVERSITY JOINT EXPEDITION AT KISH: Part II

ART AND ARCHAEOLOGY



SERPENT HEAD AT TOP OF NORTH RAMP OF WARRIOR'S STAIRWAY.

THE ARCHAEOLOGICAL SOCIETY OF WASHINGTON

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JUNE, 1931

NUMBER 6

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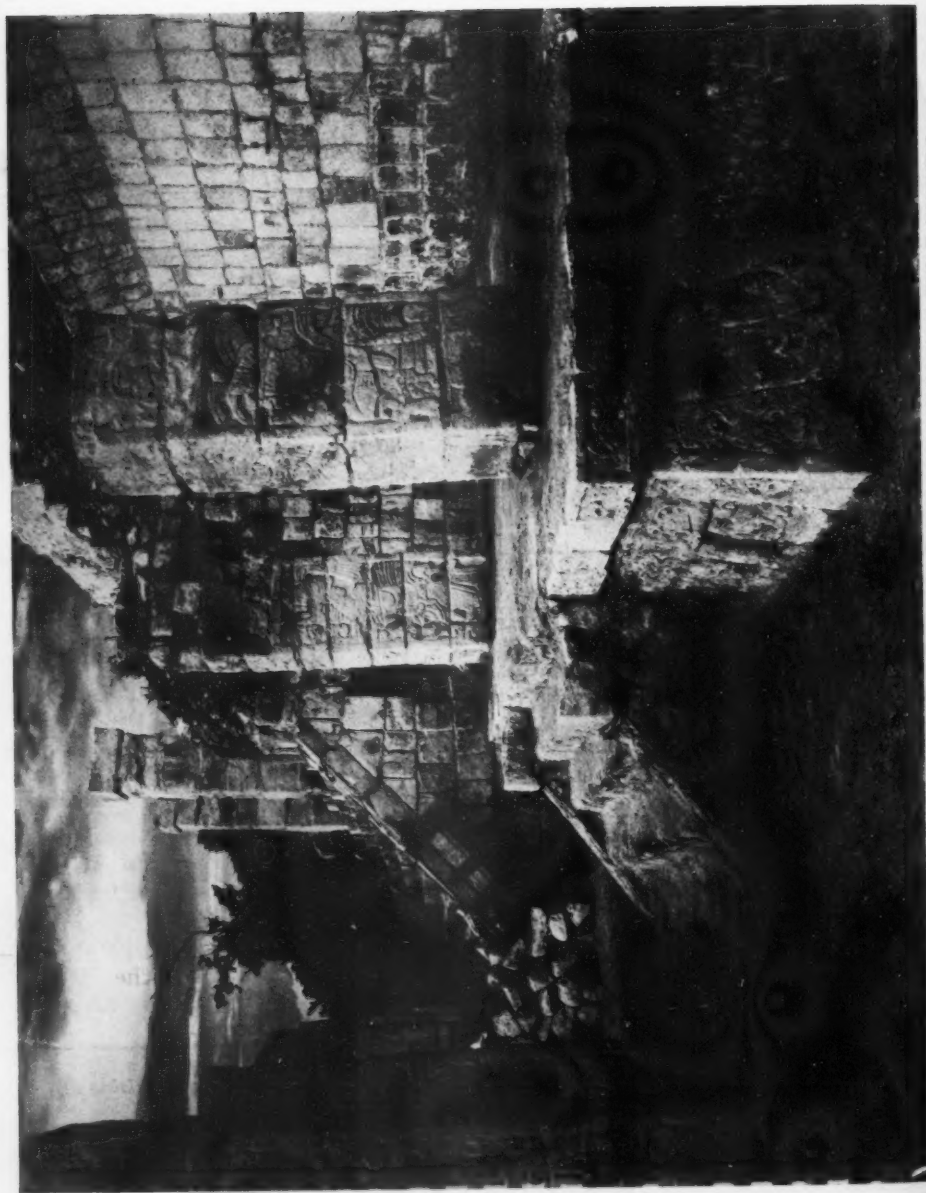
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THE SCULPTURED DAIS OF THE NORTHWEST COLONNADE, TEMPLE OF THE WARRIORS.

ART *and* ARCHAEOLOGY

The Arts Throughout the Ages

VOLUME XXXI

JUNE, 1931

NUMBER 6

THE ARCHAEOLOGICAL PROBLEM OF THE MAYA

By A. V. KIDDER

Chairman, Division of Historical Research, Carnegie Institution of Washington

This month the Carnegie Institution of Washington publishes Earl Morris's monumental work describing The Temple of the Warriors at Chichen Itzá and his successful excavation and restoration of it. By special arrangement ART AND ARCHAEOLOGY is able to present in the following pages a resumé not only of the contents of that volume, but a general survey of the whole Maya problem, both as a complete subject and in several of its phases. The compilation and editing of the five articles which follow are the work of Dr. Frank F. Bunker, editor of publications for the Carnegie Institution, who has carefully extracted from the reports of the different authorities abstracts which, taken as they are here presented, give a more comprehensive view than has hitherto appeared in any one publication. Readers of ART AND ARCHAEOLOGY desiring to refer to previously published partial descriptions of this work are referred to Vols. XXIII, No. 1, Pp. 3 and 11 (January, 1927); XXVII, No. 3, P. 99 (March, 1929); XXX, No. 6, P. 229 (December, 1930). The articles referred to are by Dr. Bunker himself, by Edith Bayles Rickelson, and by Mrs. Zelia Nuttall. Copies may be purchased by addressing the Circulation Department.

THE Maya were the most brilliant people of the aboriginal New World. Their civilization had its roots in the primitive farming culture, which originated well before the birth of Christ, somewhere in the Middle American highlands or in the Andean region, and which through ramification and diffusion ultimately gave birth to all the higher pre-Columbian developments in the Western Hemisphere. The Maya, whose earliest known remains

lie in the forested plains at the base of the Yucatan peninsula, took over or brought with them from the highlands the elements of this primitive culture: corn-growing, pottery-making and presumably also the rudiments of their later artistic, religious and social systems. In the low country they flourished like a tropical flower.

Their glyph-recorded history begins at about the time of Christ (according to Dr. Morley's correlation of Maya

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REGION OCCUPIED BY THE MAYA CIVILIZATIONS.

and Christian chronology), but before then they must already have spent many centuries in perfecting the material arts, and particularly the extraordinary astronomic and calendrical knowledge of which we find them possessed even at that remote period. The great epoch of Maya history, the Old Empire, saw the building of Tikal, Copan and many other magnificent and temple-adorned cities. The causes for the eventual breakup of the Old Empire are as yet unknown, but decay it did, and the formerly populous southern region reverted to jungle.

The Maya, however, had already been pushing northward into Yucatan, and there, during the New Empire at such cities as Chichen Itzá and Uxmal, they enjoyed a remarkable renaissance. Ultimately they fell under dominance of the rising Nahuatl powers of Central Mexico and, at the time of the Conquest, were once more undergoing a period of decadence.

What would have happened if the Spanish had not come; whether they would again have rallied and pushed

on to still further heights: or whether they, like the ancient Greeks, whom in many ways they so closely resembled, had finally expended all vital and creative energy, are questions of more than merely academic interest, for the Maya still form the bulk of the population of Yucatan and of Guatemala, and the future of those countries therefore depends to a large degree upon the ability of these Indians to receive European culture, to adapt it to their needs and to develop it in such a way as to permit them to play a worthy rôle in the modern world.

Even so brief a resumé indicates the importance of research upon the Maya. To the New World historian it is naturally of paramount significance, for the Maya were leaders in the cultural development of Middle America, influencing directly or indirectly all other groups in that entire area. The Maya, too, were the only people who consistently and accurately recorded dates, thus providing a starting point from which to work out the chronology of all the other high pre-Columbian cultures.

For the student of more general problems, the Maya also provide invaluable data. Their history involves the rise, spread, efflorescence and decline of an agricultural civilization. It gives splendid opportunities for evaluating the influence of those racial and environmental factors which have been so potent in shaping the destinies of all peoples, but whose action has been so little understood.

Carnegie Institution of Washington entered the Maya field in 1914 when Dr. S. G. Morley was appointed Research Associate. The activities of Dr. Morley and his staff fall into sequent periods of exploration and excavation.

ART AND ARCHAEOLOGY

The soundest method for attacking any archaeological problem is to conduct a preliminary survey of the area concerned in order to determine the general distribution of its remains, to sense the broader aspects of historical trends, to identify the lines of evidence which will best repay close study, and finally to select for intensive excavation the key sites which will yield the fullest information upon the customs and the career of the people who are being studied.

Pursuing the above principles, Dr. Morley devoted approximately ten years to exploring the Maya area from end to end. He visited practically all previously known sites and discovered many new ones, the most important

being Uaxactun, Xultun and Naachtun. Accounts of his very difficult journeys may be found in the *Year Books of Carnegie Institution*.

The result was a much more definite knowledge than had hitherto existed of the territory occupied by the Maya at different periods of their career; and an evaluation, based on the abundance and quality of remains, of the significance of each of those periods. In other words, a definite historical outline was achieved. Dates, hieroglyphically inscribed, formed the primary evidence for Dr. Morley's determinations. At the same time, by deciphering cryptic inscriptions and by finding and reading many new ones, he much more than doubled the known number



NORTH SIDE OF PYRAMID AFTER EXCAVATION SHOWING *in situ* PORTIONS OF FACING TOWARD THE WEST END. (A) FIRST SLOPING ELEMENT (B) PORTION OF FIRST SCULPTURED BANK (C) SECOND SLOPING ELEMENT.

ART AND ARCHAEOLOGY

of these invaluable glyphic time-markers.

For intensive excavation were selected Chichen Itzá in northern Yucatan and Uaxactun in the Department of the Peten, Guatemala; reconnaissance digging was also to be done at Tayasal on Lake Peten Itzá. These three sites cover the entire range of Maya history: Uaxactun is, on the basis of recorded dates, the oldest Maya city; Chichen Itzá was founded before the abandonment of Uaxactun and was occupied until shortly before the coming of the Spaniards; Tayasal, the last independent stronghold of the Maya, did not fall until the close of the seventeenth century.



SERPENT HEAD AT TOP OF NORTH RAMP OF WARRIOR'S STAIRWAY.

Its outstanding importance in the New Empire and, indeed, until very shortly before the Spanish Conquest, induced Dr. Morley to select Chichen Itzá as the site for the major effort of the Institution's campaign of excavation. The city was founded before the close of the Old Empire, and can therefore be expected to throw light on the earliest developmental phases of the New. During the latter period it was a leader both politically and ceremonially.

Better than any other, it illustrates the influence of the Nahua cultures of Mexico upon the Yucatecan Maya. It contains more hieroglyphic inscriptions than any of the late centers. The great length of its occupancy gives opportunity for determination, on the sound basis of stratigraphic observation, of the trends of artistic and material development through many centuries. Its remains are abundant, culturally significant and well preserved. And, finally, it possesses the practical advantages of accessibility, abundant labor supply and healthful climate.

Under contract with the Government of Mexico, which from the beginning has been consistently and effectively helpful, excavations were started in 1924 and have continued to date.

In his administration of the Chichen Itzá project Dr. Morley attempted to handle the site so as to make it an enduring monument to the genius of the ancient Maya.

To derive bare archeological facts would be simple enough. Plazas could be trenched, pyramids torn open and the still standing parts of ruined temples stripped of the mounds which now protect them. These undertakings would be speedy and relatively cheap. But they would pave the way for

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THE CHAC MOOL FIGURE, REPRESENTATION OF A MINOR TOLTEC DEITY, FOUND IN A CHAMBER OF AN ANCIENT TEMPLE WHICH WAS BURIED BENEATH THE FOUNDATION OF THE TEMPLE OF THE WARRIORS.

destruction by weather and vegetation which would very shortly reduce the city to a meaningless jumble of stone.

Both the Mexican government and Carnegie Institution have appreciated from the beginning the necessity for care in digging and for leaving all cleared structures in shape to resist further deterioration. It has been a costly business, for it has necessitated time-consuming and expensive methods of reaching objectives and has also

involved much strengthening and repair of structures in imminent danger of collapse and the replacement of fallen elements which, if left scattered on the ground, would be meaningless and would also be exposed to eventual destruction.

Preservation has not been the only concern. It has been desired that when cleared all buildings should be both understandable and beautiful. Comprehension of an ancient structure demands knowledge of its relation to

ART AND ARCHAEOLOGY

others, of the methods employed in its erection, of alterations made during its occupancy, and of the factors responsible for the condition in which it was found when excavated.

The mere uncovering of an architectural unit will therefore not suffice.

devastating collapse, there may vividly be illustrated the tremendous forces of destruction.

Intelligent understanding of a building and of what it signifies is made possible by such practical means. But subjective values must not be over-



CYLINDRICAL JARS FOUND AGAINST NORTH FACE OF COL. 7, TEMPLE OF THE WARRIORS. THE TALLEST, (A), IS 1 FOOT $3\frac{3}{4}$ INCHES HIGH, AND 4 INCHES IN DIAMETER.

Openings must be left to expose earlier remains; sometimes, as in the case of the Temple of the Warriors, large parts of deeply buried pre-existing buildings must be kept intact and rendered accessible. There should be opportunity to examine the interior, even of solid construction, to make plain the methods of the ancient mason. Careful planning permits details of wall and column, vault and roof to be easily seen and studied. And, as at the Caracol, where a section of a great fallen cornice has been held in the exact position of its

looked. Beauty, in detail and in mass, must be striven for. Unintelligent restoration, no matter how accurate, destroys beauty and so robs ancient structures of their most important psychological effect. The mere fact of ruin induces realization of the inevitable and relentless erosion of time and brings the beholder to the proper frame of mind for grasping the deeper significance of what he sees. Hence repair must not only be absolutely correct but it must be limited to essentials and never be blatantly evident.

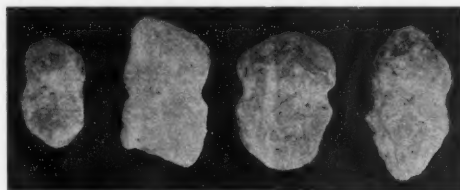
ART AND ARCHAEOLOGY

Different methods are required for each unit undertaken. Archaeological knowledge, engineering skill and a keen sense of esthetic values must go to produce the result which it is hoped ultimately to obtain. The cost has been and will continue to be great; but the obligation both in funds and in time is deliberately assumed.

In the first place Chichen Itzá, because of its outstanding scientific and artistic importance, deserves our best efforts. Second, it is thought that if the project is handled in a manner so obviously altruistic it can not fail to produce a feeling on the part of the Mexican government and the Mexican people that American agencies can be trusted within their borders. And, third, if Chichen Itzá can be kept both interesting and beautiful, it will without question become a Mecca of travel, and, incidentally, a most valuable asset for archaeology which, like every other science, needs its "show-windows." Its more recondite aims the public can not, in the beginning, be expected to grasp; but public interest must be aroused and eventual public understanding must be achieved if archaeology is to go forward; for from the public comes, in the last analysis, all support for scientific endeavor.

Adherence to the above policies shaped from the first the course of work at Chichen Itzá and dictated the selection for study of the Temple of the Warriors and the Caracol, the two principal buildings which have been excavated to date.

The Temple of the Warriors was chosen for first attack because it was the largest example of a type of late



GROOVED HAMMERS.

structure of which no well-preserved specimen remained, and so might be expected to yield architectural information not to be had from any standing temple in the city. It was also badly, apparently almost hopelessly, ruined, thus giving opportunity to find out what facts could be learned and what materials could be rescued from such a mound, of which literally hundreds exist at Chichen Itzá and other Yucatecan cities.

Work at the Temple of the Warriors occupied the four seasons from 1924 to 1928 inclusive. Mr. Earl H. Morris, who was in charge throughout, has transformed this most unpromising pile of stone into an impressive and lasting monument. Every phase of its long structural history has been elucidated, and every successive increment has been left in such condition as readily to be understandable by the visitor. The finds of sculpture and fresco were abundant beyond all expectation. The final report upon the Warriors by Mr. Morris and his collaborators is now in press.*

* This report has now been published by Carnegie Institution of Washington, being publication No. 406, entitled, *The Temple of the Warriors at Chichen Itza, Yucatan*. This is published in two volumes. Volume I consists of 500 quarto pages of text illustrated by a frontispiece in color and 323 line cuts and half tones. Volume II consists of 170 full page plates, 80 of which are in color. A few sets will be reserved for sale at \$20.

THE TEMPLE OF THE WARRIORS

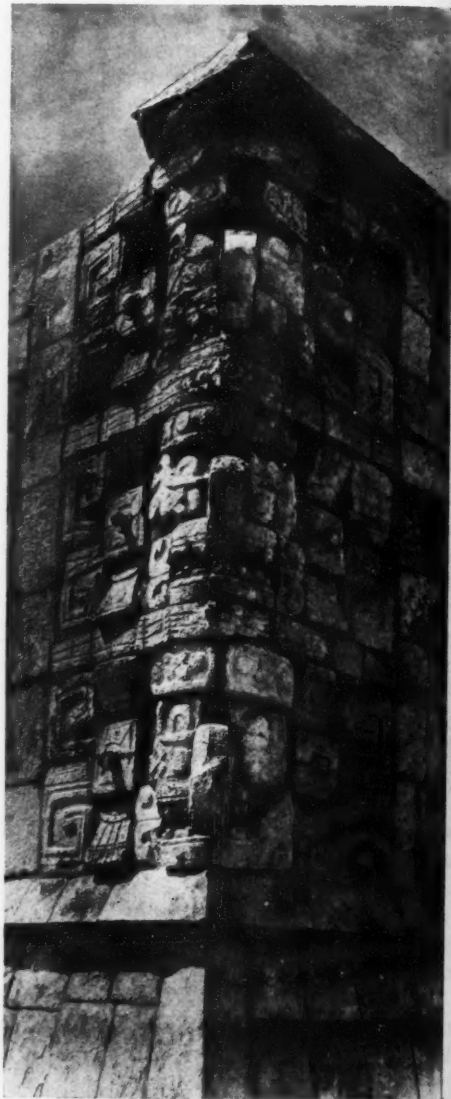
By EARL H. MORRIS

Archaeologist, Carnegie Institution of Washington

IT is doubtful if the Chichen masons relied upon any other leveling instrument than the human eye. Rarely, if ever, does a platform, terrace, floor or cornice represent a true horizontal. For instance, the molding courses on the south side of the Warriors Pyramid are about 30 cm. lower at the east than at the west end, and the floor of the Northwest Colonnade slopes upward for a distance, then falls, then rises again. Such deviations are everywhere to be observed. If they knew a formula by which to lay off a right angle, they seldom used it, at least with precision. Every corner that has been measured is either somewhat more or somewhat less than 90°.

They were familiar with the line and the plumb-bob, and used them with pleasing skill. In vertical aspect, the corners are handsomely aligned and the long horizontal courses, most conspicuously the moldings and cornices, run straight and true from corner to corner, even though the latter occur at different levels. Without the line, such accuracy would have been impossible of attainment.

Of the minor tools we know far too little. One can imagine the brown workmen scooping and scraping mortar about with potsherds, pieces of gourd, shell, and wooden paddles. In the southern of the two columns of the Temple of the Warriors which had to be taken down while the room beneath was excavated, stone chips, inserted as wedges, had prevented one of the blocks from touching the mortar at the center of the one beneath. The



MASK PANEL, NORTHWEST CORNER, TEMPLE OF THE WARRIORS. PORTIONS OUTLINED IN BLACK, MADE OF CEMENT TO REPLACE MISSING ORIGINALS.

ART AND ARCHAEOLOGY

mortar plainly showed the long wiping strokes with which it had been spread. The implement had been about 5 cm. wide and had a rough edge, such as might have been present on the end of a stick or paddle broken across the grain.

For finishing plastered surfaces, there can be little doubt that a wooden tool was used. Several of the masons em-

gripped by the hand. They were more difficult to handle than a steel trowel, but when plied by one familiar with their manipulation could produce as smooth and lustrous a finish as the quality of the mortar would permit.

It would be of marked interest to know what units of measurement were employed. There can be no doubt that some set standards were recognized. It is possible that were one to take a very long series of measurements of structures, and the individual features thereof, and find common divisors for them, the original units and their multiples would be discovered.

Although the craft at Chichen Itzá had carried the art of masonry construction to a very high level, they failed to recognize, or at least to apply, two basic principles, the lack of which greatly weakened their work.

They utterly disregarded the breaking of joints. Often, block after block was put one directly above the other with no overlapping upon those at either side. Thus the effect is as if the face were composed of vertical panels. The suggestion has been made by Holmes that the wall faces were regarded as nothing more than decorative mosaics, hence were not depended upon for strength, nor expected to bear much of the strain of the building. Thus the wall cores would have been the functional portions. These cores, in every respect save their more irregular faces, are of exactly the same character as the "*mampostería*" walls that are the standard type of modern Yucatecan masonry.

The second great oversight of the Chichen masons was their failure to bond the face courses to the hearting. Cornice elements are positively the only header courses which occur, and when the cornices are composed of



SERPENT HEAD WITH HUMAN HEAD IN JAWS FROM MASK PANEL, NORTHWEST COLONNADE.

played upon the repair work explained that when they were apprentices, the "masters" still used polishing tools made from one of several of the very hard woods of the country. These were described as having varied from one to two spans in length, from 5 to 8 cm. in thickness and as having had a width such as could conveniently be

ART AND ARCHAEOLOGY

more than one member, only the lower one is deeply tenoned into the wall, its strength being depended upon to bear the weight of all jutting features above it. Thus, in the most customary type of façade there would be only three



HUMAN STATUETTE FROM FAÇADE, NORTH HALF OF
NORTHWEST COLONNADE.

header courses in the total height; the lower cornice and the nether members, respectively, of the medial and upper cornices. And in vertical interior walls, that is, in the expanses from floor level to the spring of the vaults, there were no bonding devices whatever. In many cases, however, a fairly deeply inserted string course occurs beneath the first

vault stones, providing a relatively stable bed-plane for them.

The utter failure to bond the corners has greatly hastened the collapse of many buildings. Everywhere this condition is conspicuously apparent.

Stone cutters at Chichen Itzá seem to have possessed an extremely limited range of tools, and representatives of the types that they did know and employ are surprisingly scarce. To one who has excavated in other fields, it seems incredible that such tremendous masses of man-made debris as have been handled in and about the Warriors could fail to yield quantities of lost and discarded implements and other minor artifacts. But the fact is that very few of any sort have come to light, and a number of those to be described and figured were found elsewhere in the city. It is probable that work in some of the old quarries would be rewarded by a large series of implements, but it is doubtful, in the writer's opinion, if the range of types would be greatly amplified.

It is really superfluous to say that all of the stone cutting was done without metal. Gold and copper were the only metals known to the pre-Columbian Yucatecans, and points or blades of copper would have been utterly useless for the working of stone. Moreover, all tool marks plainly indicate that they resulted from the impact of stone upon stone.

The most primitive and most prevalent type is the pecking stone. This tool is certainly of very ancient origin, and must have had an extremely wide distribution. Except for difference of material, examples from Chichen might have been picked up at any one of a thousand ruins in Arizona or New Mexico without raising comment.

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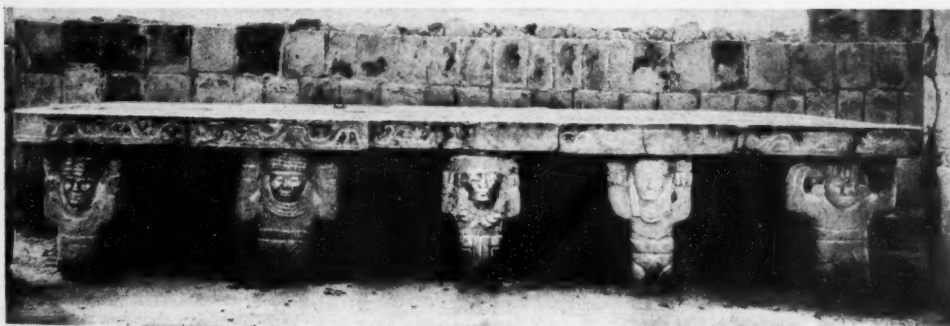
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THE ATLANTEAN ALTAR DURING REPAIR.

To fashion such a tool, a more or less spherical or globular pebble or boulder was selected, and along one side of it spalls were struck off both toward the left and toward the right until a rough jagged edge had been produced. The opposite side retained

its original smoothness, so that it could comfortably be grasped in the hand. Thus held, it was, in effect, a hafted pick or chisel, the arm constituting a flexible helve and the sharp edges the cutting points. These pecking stones are nodules of the low-grade, creamy-



ATLANTEAN ALTAR AFTER REPAIR.

ART AND ARCHAEOLOGY



ROOF FRET FROM NORTHWEST COLONNADE. THIS ONE WAS VERY CARELESSLY FASHIONED.

white flint that occurs in some strata of the native limestone. As the result of long wear, the objects were finally abraded to almost spherical form, after which they were usually thrown away.

While it may seem a fantastic notion, the writer suspects that wood may have been used to some extent in stone working at Chichen Itzá. Surfaces were reduced by pecking, but for smoothing them and for deepening and smoothing incised lines, first graven with a sharp spall, a blade or point of such wood as *cholul* could have been more or less effective. De Landa mentions *cholul* wood as being hard as a beef bone, and states that native swords and daggers were made of it. Were the limestone tough or abrasive, wooden blades could have had no particular effect upon it, but since it flakes most readily and is absolutely gritless, they would have been fairly serviceable for the purposes suggested.

For the shaping of ordinary wall stones it would seem that the blocks were broken to pieces as best they could be, with a tremendous amount of wastage. The increments were examined with reference to the largest plain surface that could be produced with a minimum of labor, then abraded by pecking until they were practically flat. As a last step, came the trimming of the edges to produce an approximately rectangular outline for the faced surface. Evidently the plain wall material for a particular building often was cut to specification. The general uniformity of course height is an evidence of this, and the variation in average size of the blocks of different structures serves as a further confirmation. For instance, the units in the Temple of the Tigers are relatively enormous; those in the Temple of the Chac Mool were quite small, and those in the Warriors, intermediate between the two.

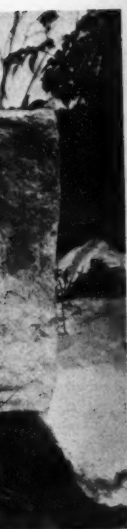


ROOF FRET FROM NORTHWEST COLONNADE. THIS SHOWS HOW SOME WERE NEATLY SHAPED AND SOMETIMES CARVED.

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LOOKING NORTH BETWEEN SECOND AND THIRD FILES OF COLUMNS, NORTHWEST COLONNADE.



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AND SOMETIMES

It is noticeable that, in general, very large blocks were not used, except where some structural consideration made their presence particularly desirable. The ordinary face stones rarely are larger than 35.5 by 50.8 cm., and, in the hearting, one seldom sees a rock that a strong man could not carry. However, in corner-stones, corner members of molding courses, and column blocks, masses occur that would not have been easy to bring from the quarries.

The component blocks of the bottom course of the five-member cornice of the Caracol and many of the blocks of the cornice of its substructure are relatively tremendous. The largest single stones in the city are the serpents' heads in front of the Temple of the Tigers. The latter weigh not far from 7.25 metric tons each. To have trans-

ported such blocks from the spot where they were carved, without wheeled vehicles or beasts of burden, was a formidable task, but certain it is that it was done. It is altogether probable that rollers were used in horizontal movement, sections of tree trunks being adequate for the purpose.

The raising of the blocks was the real problem. This must have been accomplished by the use of ropes and man power. A people as far advanced as were the Maya, may be expected to have known as close an approach to the pulley as a line passed over a smooth pole, but surely they had no more complicated mechanical devices than this.

Much as one admires the successful placing of the largest stones at Chichen Itzá, such accomplishment was far surpassed in Old Empire days, as at Quiri-

ART AND ARCHAEOLOGY

gua, where the largest stela, quarried at least 4.80 kilometers from its point of erection, weighs not less than 45 metric tons.

Sawing of stone seems not to have been as commonly practised at Chichen as it was at Palenque. That this variant of technique was occasionally em-

are the only examples of what might be called architectural stone polishing to be observed.

One great realm of activity of the Maya builders is likely to fail to impress one. Huge masses of stone remain as an eloquent testimonial of the labor that the gathering and shaping



HEAD OF THE NORTH SERPENT COLUMN.

ployed is shown by certain of the fret-like roof ornaments. The portions that were to be removed from enclosed areas of these flat slabs were surrounded by slots cut in from both sides until the grooves met near the center of the stone. The sides of such grooves are smooth, showing that a back-and-forth motion was used. In fact, surfaces produced in this way, whether in actual manufacture or in sculptured detail,

cost, but the wood that formed an important feature of the ancient structures has, with rare exception, decayed and left no visible traces of its presence. Nevertheless, a vast forest was felled, and contributed its substance in one way or another to the temples at Chichen.

A minimum of sixty-five hewn beams, averaging about 2.75 meters in length, served as the support of the super-

ART AND ARCHAEOLOGY

structure of the Warriors Temple. Only the hardest woods, such as *zapote*, *cholul*, *chacte* and *jabin*, were capable of sustaining the weight these beams were called upon to bear. And these varieties of timber, obviously, were the most difficult to cut and shape. It would have cost fully as much labor to fell a tree of suitable size and to square it into a beam, as it would to have hewn a beam of stone of the same dimensions. There was less bulk to remove, but the toughness of the wood fiber made work upon it with stone tools particularly tedious. And one must realize that a great many of the beams were not only hewn but elaborately sculptured.

In the latter lay the real test of skill. A blow of a point upon stone sent most of the loosened substance flying in small chips, leaving only a minor residuum of dust that could be blown or brushed off and forgotten, but a similar blow upon wood merely frayed a few stringy fibers that must be cut or torn away before they ceased to be obstacles. It was necessary to remove them most carefully, lest they follow the grain into some area that it was desired to leave in relief. Constant attention and precision of movement were prerequisite to successful accomplishment of the task. The transverse cutting of the grain with flint spalls, and the picking out of longitudinal fibers with a point, presumably of bone, must have been the dominant features of the wood graver's technique.

However, such methods would not produce initially as clean a surface as would an incision with a steel blade. Under the circumstances, smoothness of the lines would have been obtained by scouring and rubbing, which would have been a slow procedure without a local supply of abrasive stone or gritty

sand. Weeks would have passed in the graving of a single log, and all the while the wood would have been becoming more seasoned and commensurately tough.

It is quite impossible to form an adequate conception of the amount of labor expended in the construction of one of the ancient buildings. The builders faced the material environment, equipped only with determination and their naked hands. From tree and rock they were called upon to shape the few crude tools they knew how to fashion, and with these they hacked and beat the face of nature into a materialization of the images cast by the lens of imagination upon the curtain of their minds. We have no approach by which to judge of the magnitude of the task involved in any given unit of construction, under the conditions operative at the time of its erection.

While presumably the existing order was accepted philosophically enough as long as it was in full momentum, it needed only such a conspiracy of events as the series of hurricanes, crop failures and epidemics, which took place shortly prior to 1520, to disrupt the mechanism of enforcement which had long operated with undoubted vigor. When once the human beasts of burden found it possible to scatter into the forest, where they had to labor only enough to provide their own sustenance, they would not have been slow to improve the opportunity. Thereafter, not enough time had elapsed before the coming of the Spaniards to permit another generation of rulers to perfect anew a juggernaut wherewith to wring from the masses such a tribute of life and labor as previously had been devoted to the edification of the gods.

RESTORATION OF THE TURQUOISE MOSAIC PLAQUE

By SHOICHI ICHIKAWA

Department of Anthropology, American Museum of Natural History

In the course of his excavations Mr. Morris learned that two structures had been erected on the same site and that the Temple of the Warriors was the later. The older of the two temples Morris named the "Temple of the Chac Mool" from the fact that a magnificent Chac Mool figure was found in one of its chambers. This older temple, the Temple of the Chac Mool, lay below the Temple of the Warriors which was built directly above it. Evidence of the existence of the older structure was not discovered until after the major excavation had been completed.

Upon discovery of this buried temple, Morris expended great effort in defining its lines, in clearing its rooms of the filling placed in them by the ancient builders, in shoring up its walls to prevent collapse under the enormous weight resting upon them, and in driving shafts for air and light and easy access. Then came study of the art elements by the staff artists and the making of copies in color for the use of students of Maya culture. Finally the day came, long postponed, when Morris made exhaustive search of the chambers of this ancient structure for dedicatory offerings.

In one of the rooms clear evidence of an ancient altar that had disappeared had already been found. Cutting into the floor beneath the part assumed to have been covered by the altar tablets the pick finally touched an object unlike the materials composing the floor. When uncovered this object proved to be the lid of a large stone bowl. Carefully opening it Morris found that it contained ornaments of jade, and below a thin stratum of dust and earth he caught the glint of turquoise and the faint outlines of a rare ornament of mosaic type.

With infinite patience Morris removed, grain by grain, enough of the obscuring film to reveal the true nature of the find. Many of the pieces of the beautiful mosaic were still held firmly in place by the original lacquer. Much of it lay loose upon a layer of dust which had once been the wooden backing to which it was cemented. With unsparing care Morris then removed the jar to a place of safety.

Restoration of the plaque was deemed of such importance that President Merriam, who was present when it was discovered, cabled to the American Museum of Natural History requesting the loan of their ablest artist-preparator. Accordingly Mr. Shoichi Ichikawa was sent to Chichen Itzá. In speaking of the result of Ichikawa's work Morris has said:

"In the repair of the disk Mr. Ichikawa found a task worthy of his mettle. It called for all the skill and ingenuity at his command, but at the end of six weeks, the plaque appeared practically as of old, barbarically beautiful and in condition to last for centuries if properly cared for. In addition Mr. Ichikawa made a facsimile copy in full color, so skilfully done that I have seen more than one put out a finger tip to flick off a grain of sand which was but a painted reproduction of one really present upon the original."

Upon the accomplishment of this task the plaque was turned over to that division of the Mexican Government which supervises archaeological activities, the Ministry of Public Education. It now rests in the National Museum in the City of Mexico where those who will may pause before it and marvel at the skill of pre-Columbian lapidaries.

WHEN I took the cover off the stone jar which contained the plaque, I saw the mosaic which was for the most part visible. I was very much disappointed, because the color was very ugly and completely betrayed my expectation. I was told that it was beautiful beyond description, but now it had turned the color of half-green to dried straw, due to the

fact that some chemical substance thinly covered the entire surface of the plaque. I examined the contents of the jar minutely with the aid of a powerful magnifying glass and picked out all the suspicious tiny remains, which easily escape one's attention, with a pincers and kept them in labeled boxes for future examination. The upper contents had already been removed

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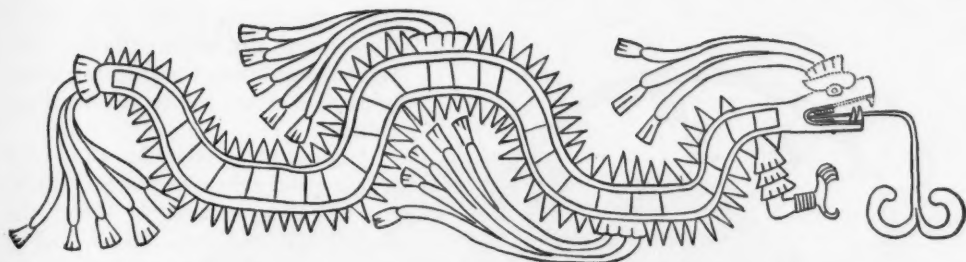
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RESTORATION OF TYPICAL SERPENT. WALLS OF CHAC MOOL TEMPLE.

by Mr. Morris, and the rest of the remains were practically a powdered substance, excepting the mosaic.

I brushed off the non-important remains carefully, using camel hair brushes for the purpose until the entire surface of the mosaic was exposed. I found two-thirds of it held together by a pitch-like substance, but it was curled

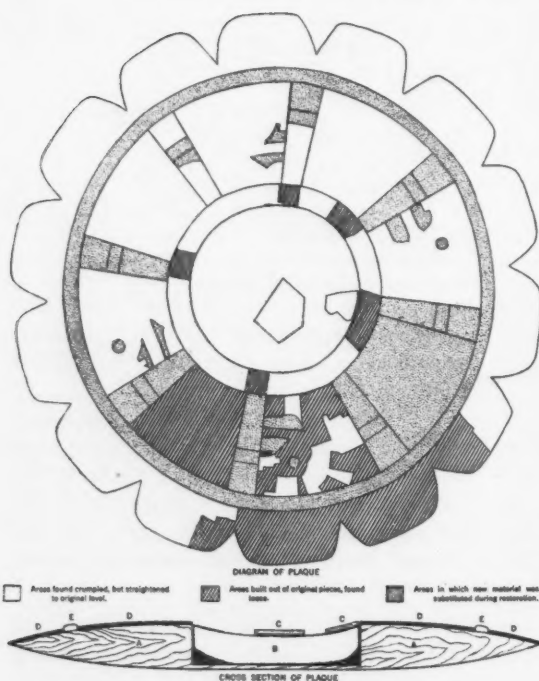
up by moisture and age-long pressure from above. One third of it had fallen to pieces.

The center was a yellowish concave sandstone disk with two large pieces of reddish brown mosaic stones. I took all necessary measurements for determining the exact size of the plaque in its original state by laying



THESE DRY WALLS, a, b, c, WERE ERECTED TO PROTECT THE COLUMNS OF THE TEMPLE OF THE CHAC MOOL DURING RAINY SEASON OF 1926-27.

ART AND ARCHAEOLOGY



a wet cotton thread in a straight line on the uneven surface of the mosaic and stretching it out. I also made a careful sketch of the designs. These measurements and sketches were simply a matter of precaution in case of destruction of the shape and design by removal.

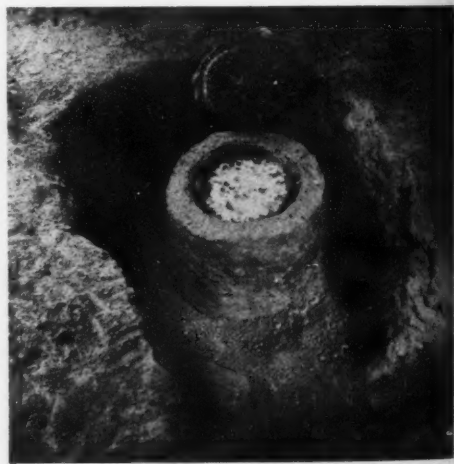
From the edge of a fallen part of the mosaic, I could see underneath it and noticed a differently colored powder from the other remains. This proved to be the remains of a wooden disk on which the mosaic once was laid. This powdered substance was very important to me as a reference in reconstructing the original form of the plaque, so I decided to take the utmost care with it.

I gave a thin coat of liquid celluloid to the surface of the mosaic to prevent breakage. Up to this point, the work

took me three days, and now I was facing the most difficult task, that of removing the fragile mosaic from the stone jar to my working table.

I thought it wise to work out a few good schemes before removing the mosaic and to select the most practical one. So I locked up my work-room and spent the whole day outside, thinking about the process of removing the mosaic. That night at about one o'clock, when everybody was sleeping, I started the delicate enterprise as I was then safe from any unexpected interruption and the calmness of the night makes for better concentration.

I produced a spool of cotton thread and tied one end of the thread in a knot. I dipped the knot in liquid celluloid, glued it on the mosaic, drew the thread outside of the jar and cut it with the scissors. I repeated this until more than twenty threads were stuck at one end all over the mosaic. Then



LIMESTONE JAR CONTAINING ALTAR CACHE *in situ*,
TEMPLE OF THE CHAC MOOL.

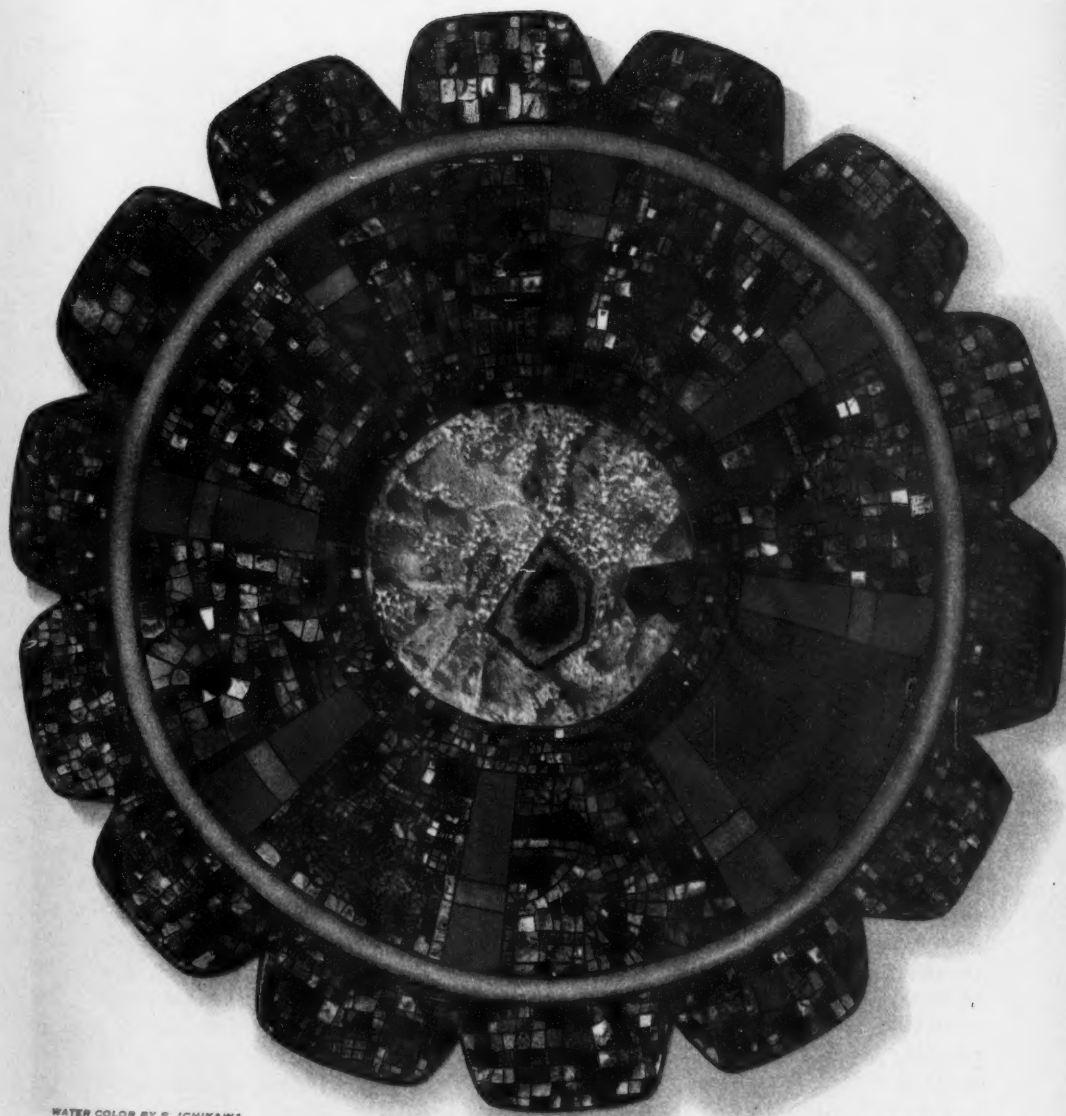
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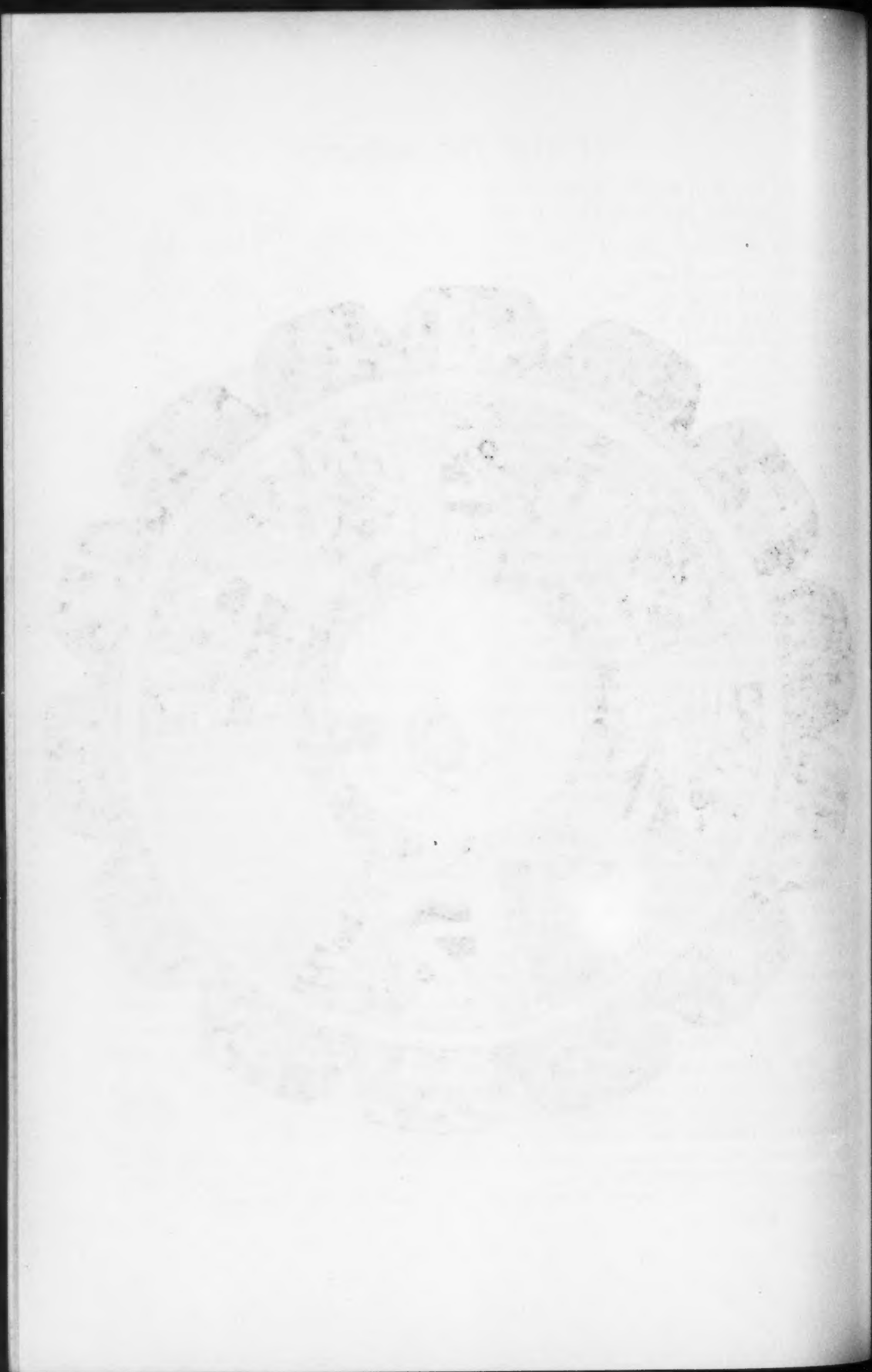
CACHE *in situ*,
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WATER COLOR BY S. ICHIKAWA

LITH. A. HOEN & CO., INC.

THE TURQUOISE MOSAIC PLAQUE. ABOUT THREE-FOURTHS ACTUAL SIZE.



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I took two small wooden sticks, placed them crosswise and from edge to edge over the mouth of jar. Next I gathered all the loose ends of the threads over the crossed sticks in the center and secured them in a bunch.

The deck of my working table being cleared, I placed it as close to the stone jar as possible. Holding the bundle of threads in my left hand, discarding the sticks, I started pulling the mosaic upwards very cautiously, my right hand assisting, carefully and diligently working with a pincers. Gradually the mosaic lifted from its position without disturbing the contents below, and finally was removed safely to the table. Then I cut off all threads very closely. Thus the most tense moment of my life passed.

I made a thorough examination of the powdered substance which was left under the mosaic. Measurements of the thickness of the powder at every point were then taken, and gradually brushing off the powder, I found a dark red powder as the bottom layer. This red powder proved to be the original color, painted on the back of the plaque.

Lastly I removed the round sandstone disk which was left in the center, and found the same powdered substance in the same order with other parts. This proved that the sandstone disk was set into the wooden disk but not pushed through the wood. I also took measurements of this powdered substance as well as the sandstone disk. As a result of the measurement of this disintegrated wood, it was found that the original wooden backing of the mosaic was of decreasing thickness toward the circumference. It followed that the plaque must have been somewhat elliptical in section.



TYPICAL PRIEST, TEMPLE OF THE CHAC MOOL.

To find the exact variations of thickness as well as the shape of the outer edge, whether square or rounded, became the problem. Fortunately, I found among many of the fallen mosaic pieces, a small outer edge piece of the plaque which gave the angle of the incrustation from the outer edge to the center. Consequently I gathered all the factors for the reconstruction of the wooden disk on which the mosaic later was to be laid except the surface curvature, for which all the data are lost since the mosaic was out of its original shape as I have mentioned before—and also the exact nature of the original wood.

I had a consultation on this subject with Mr. Morris, and finally decided to take the surface curvature of a plain sandstone plaque, which was found on another temple site, now preserved in

ART AND ARCHAEOLOGY

storage, as a sample and the wood of any available tree, but well seasoned. After quite difficult study, I drew the plan of the wooden disk to be made, based on the above data and gave directions to the carpenter in the camp, for the making of the disk. Later he made a very good job of it.

Following this I made an accurate plan of the mosaic on Japanese paper which I pasted with liquid celluloid on the wooden disk already made by the carpenter. The next step was making the mosaic in even surface: i. e., to flatten it. I had already tested the substance which held the stones with crude ether and found that it dissolved. I broke the mosaic off in pieces of convenient size and wetted them with ether and an alcohol mixture, putting each in a separate cigarette box matted with cloth soaked in the above chemical mixture, covered tight, and let them stand for a few hours. I found them all to be pliable, made so by the fumes of the chemicals. I took them out, putting flat boards as a weight on the surface of each mosaic piece, and left it to dry.

I sifted all the remaining powdered contents at the bottom of the jar with cheesecloth, picking up all loosened stones of the mosaic and cleaned them in chemical. I also picked up all the suspicious looking objects and kept

them for future examination as before. I did not know the real name of the substance which held the stones of mosaic, and thought it might be the sap from a tropical tree. So I went in the woods, spent a half day in gathering different kinds of tree sap, and tested them with the same chemicals which I applied to the above-mentioned substance, but all failed to be of the same material.

Next I started to lay all the mosaic pieces on the wooden disk on which exact positions were already drawn. It was matter of patience from start to finish.

I can only add that the restoration of the original color of the mosaic was obtained by careful polishing, application of fine linseed oil and exposing it to the tropical sun.

The making of the water color drawing of the mosaic plaque was comparatively simple work but required excellent judgment and infinite patience. There were nearly three thousand pieces of stone, and I sketched faithfully the color of each, without missing the stains and cracks.

The most difficult part of the drawing was the outlining of the stones in their exact size and position. This was done, after several failures, by transferring the outline impression by rubbing on thin but strong Japanese paper.



THE BAS-RELIEFS FROM THE TEMPLE OF WARRIORS

By JEAN CHARLOT

Staff Artist, Chichen Itzá Project, Carnegie Institution of Washington

Such expressions of the art of the Maya as have survived are to be found chiefly in the more durable forms of architecture and of stone sculpture. Of wood carving, stucco modeling and painting, only a few fragments have been recovered, for in these arts more delicate and more easily disfigured materials were employed.

Originally the stone framework of the temples built by the Maya was covered with a wealth of decorative sculpture and stucco, delicately polished and treated with vivid and varied colors. The roof of the Temple of the Warriors, for example, was supported by columns of stone, each of which was made up of from eight to eleven blocks bedded, one upon the other, in lime mortar. All were sculptured on all four sides, the ornamentation being the same in its major aspects. Each base is graven to represent a composite, shieldlike device; each shaft portrays a warrior or priest, richly garbed and adorned; and upon each capital is an inverted arc from the nether side of which issues a human form in diving posture. In addition to being sculptured the columns were brilliantly painted.

THE bas-reliefs examined and illustrated in this study total 337 panels, each comprising a life-size human representation and two decorative *motifs*. Our first concern was the obtaining of a correct and complete reproduction of the originals.

It was therefore decided to draw to scale the material considered, and the first problem that presented itself was the projection on a flat surface of the four-sided, somewhat irregular, square columns.

A process similar to that used for reproducing pottery decoration was adopted, which has the advantage of giving simultaneously the four sides of each column, while still preserving their unity. One angle of each column was established as an axis of development and the four faces were spread out flat. Such a procedure presupposes geometrically straight and true vertical lines, and involved a theoretical correction of the somewhat ragged sloping edges of the blocks, thus distorting slightly the width of the band that frames each panel.

The best-preserved specimens are reproduced in full color with all the details of their actual appearance. A simpler schematic method was adopted for the other panels, by which the various accidental defects caused by decay are eliminated.

Nearly all the bas-reliefs to be described in connection with each architectural unit appear on the faces of columns. The same technique was probably followed in all of them, from their quarrying to the last coat of paint.

The columns were made of relatively soft limestone, as were the other architectural elements of the building, and consist of rectangular blocks varying greatly in height. Only four of the six faces of each block were carved. The other two were left unpolished, since the rough surface helped to catch the mortar with which the parts of a column were joined. The surfaces to be sculptured were smoothed, but were not polished. Probably because of the great number of stones required, blocks with serious defects and holes or depressions were not rejected, as it was

ART AND ARCHAEOLOGY

apparently assumed that the stuccoing and painting to be applied later would obliterate these faults.

The blocks were probably sent from the quarry already trimmed, to avoid useless weight, and in groups, each of which constituted a single column. Irregularities in shaping the blocks and

before the stones had been thus sealed together, because of the delicate continuity that must exist between two segments of one line in passing from one block to the next. Various indications demonstrate that the sculptor did not begin his work until the room or gallery had been roofed and the columns



PLUMED SERPENT SHIELD AND SOUTH PANEL OF MASK, NORTH ANTA, TEMPLE OF THE WARRIORS.

the imperfect measurement of the squared stones, as they lay horizontally in the quarry, are sufficient to account for the slight differences that occur between the heights of the columns in place. Some correction of initial errors was possible by varying the spaces between blocks when these were filled with mortar.

The carving proper could not begin

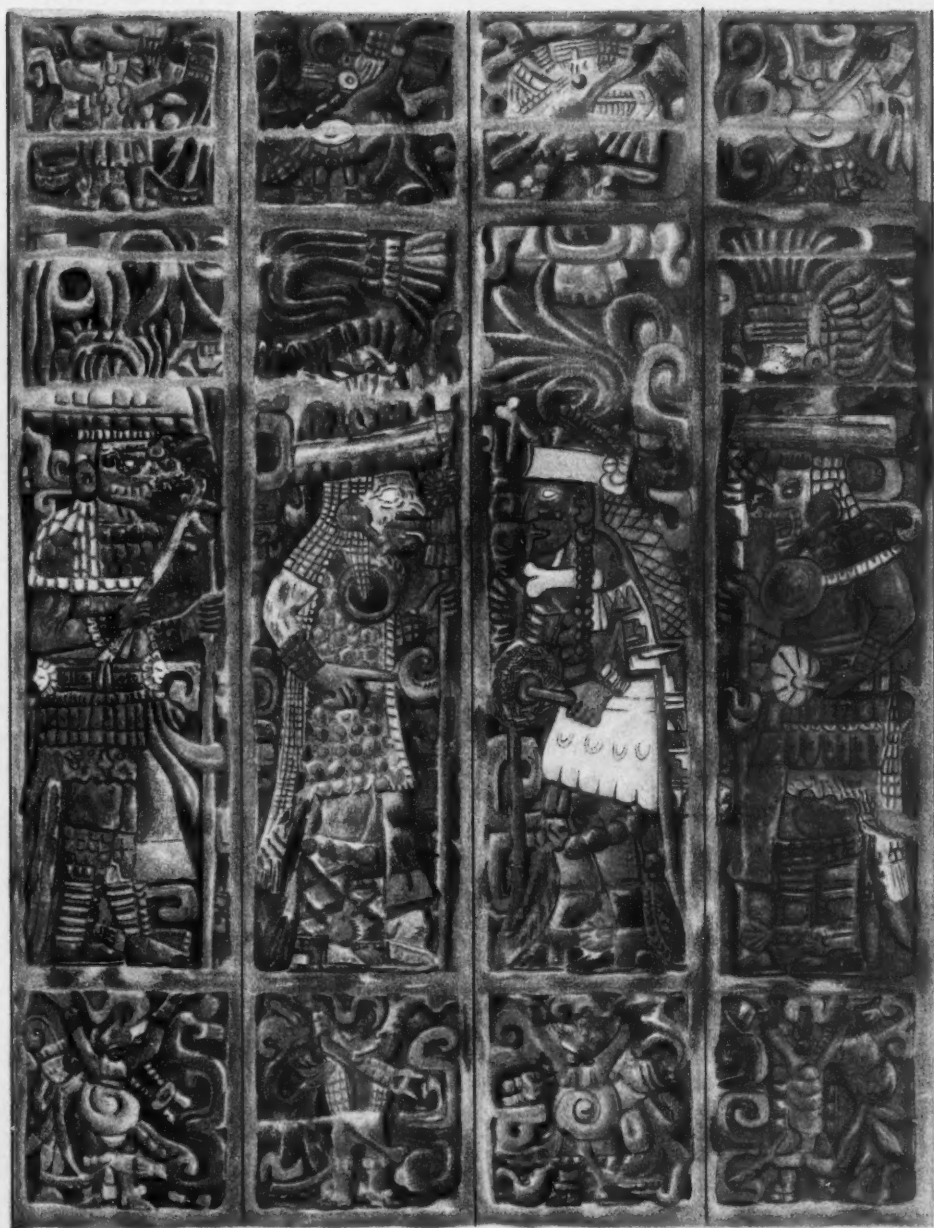
were actually functioning as supports for the finished arches. It would seem logical that the artist could not work freely upon his composition *in situ*, before the roughest work was concluded and the masons' scaffolds had disappeared. The junctions between blocks, which broke the continuity of the surface and thus interfered with the preliminary sketch, were smoothed over

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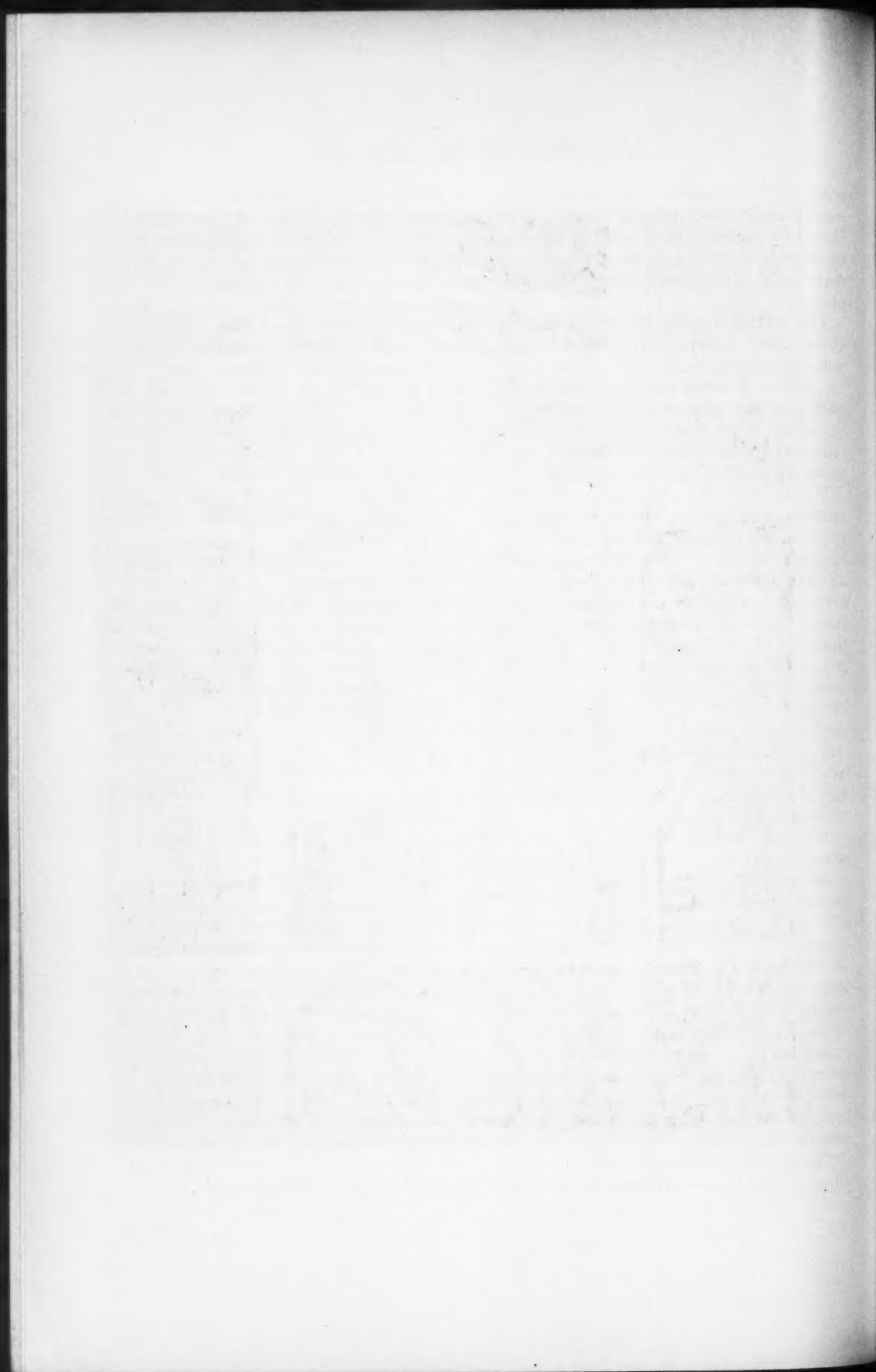
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WATER COLOR BY ANN AXTELL MORRIS

LITH. A. HOEN & CO., INC.

A SCULPTURED AND PAINTED COLUMN FROM THE TEMPLE OF THE CHAC MOOL.



ART AND ARCHAEOLOGY

with stucco before the artist set to work; while the delicate work of relating two segments of carving in stone by stucco modeling naturally would be done only after the carving was completed.

The artist began his work by dividing the column into three components—base, shaft and capital—and on each a general massing of the elements to be included in the picture was sketched with hard charcoal. Then followed delineation of details with more accurate depiction in view.

When one considers the enormous number and variety of ornaments portrayed in minute detail, and their fusion in human representations, nearly all with a strong individual stamp, some even with a name and obviously portraits, it seems impossible to suppose that the artist worked only from memory. Rather it is highly probable that work on the stone itself was preceded by preparatory sketching from living models on a more perishable material and on a smaller scale. The artist, working from such sketches, could amplify and modify as the permanent version might require.

After the subject was drawn on the stone, the carving followed. This was a process of cutting away the background from the outline, so as to silhouette the figure upon it in relief. Then the details were cut inside this silhouette. The most important lines were made by double diagonal incisions which met in the middle, like a furrow, the sloping edges thus formed giving to the plane a suggestion of spheric modeling. Minor lines were made by one vertical stroke, while the lightest were simply scratched on the surface.

Though the stone is soft, it would appear from the constant hesitations

in line and the irregularities of the surface, that a tool of but slightly harder material was used, probably a roughly chisel-shaped stone. A point was used to deepen the furrow and to trace small lines. Holes were prepared for incrustations, the hollow remaining unpolished in order to insure adherence. In the parts of the Temple of the Warriors where the light was bad, and especially in corners distant from the altar, the sculpture consisted of hardly more than a few scratches, partly on stone and partly on stucco, barely an indication for the painter to work upon.

On columns that stood in a particularly good light or in a prominent place, the carving was finished off by polishing, so as to prepare a finer ground for color. Attempts to round the surfaces more thoroughly are rare and occur mainly in portrayals of small objects. The incrustations were probably inlaid after carving and before painting. All of them were intended as eyes. The best incrustations are of white shell with a circular hole in the middle, which was filled with a kind of tar to serve as the pupil of the eye. It seems that in some cases a cheaper material, probably white lime, was substituted for the shell.

When the carving and inlay were entirely completed, the painter began his work. A fixed scheme was followed. The background was painted dark red, the frame blue, and the objects portrayed as near their natural colors as the limitations of the Maya palette permitted. The painter did not, however, adhere slavishly to the line made by the sculptor. It is interesting to note that he followed it freely, and often ignored it entirely. In some cases, he changed the proportions of the objects in the painted version, apparently for no other than an aesthetic



SCULPTURED COLUMNS IN THE TEMPLE OF THE WARRIORS. COLUMNS OF LIMESTONE, SCULPTURED IN LOW RELIEF ON ALL FOUR SIDES, SUPPORTED THE ROOF.

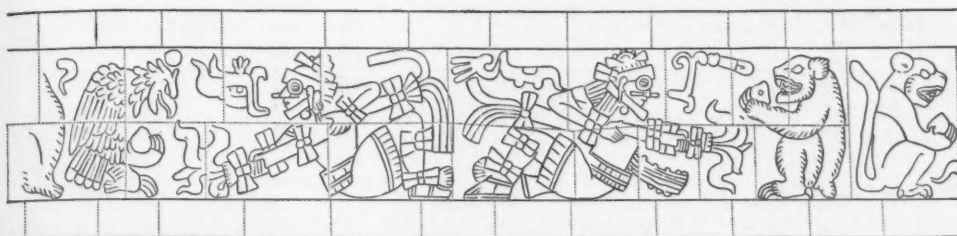
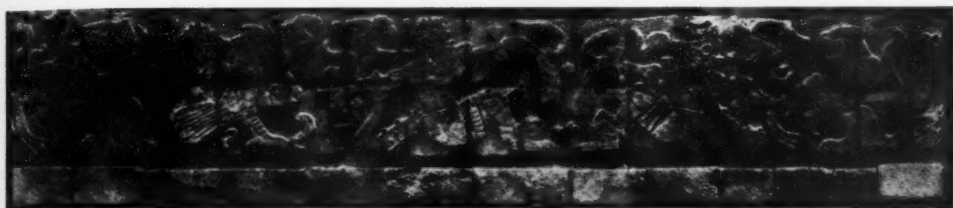


FIG. 25—PORTION OF FIRST SCULPTURED BAND, SOUTH SIDE OF PYRAMID, SHOWING BLOCK PATTERN



PORTION OF SECOND SCULPTURED BAND, SOUTH SIDE OF PYRAMID.

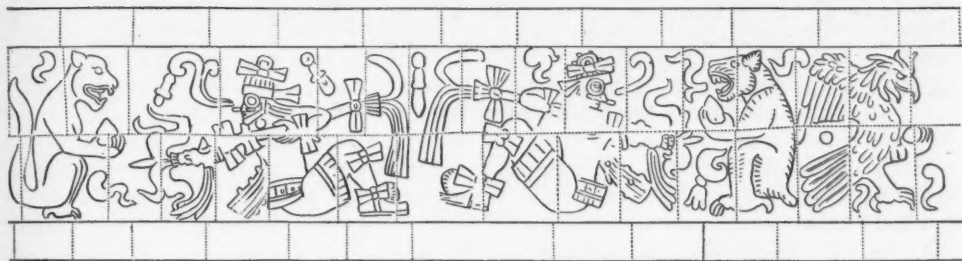
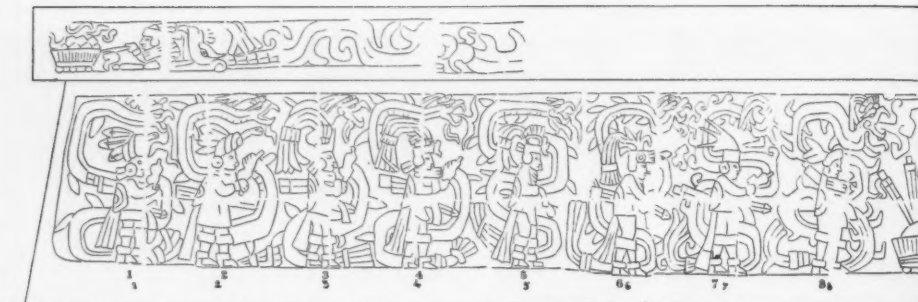


FIG. 26—PORTION OF SECOND SCULPTURED BAND, SOUTH SIDE OF PYRAMID, SHOWING BLOCK PATTERN

purpose; in others, he added objects or completed parts forgotten by the sculptor. These variations between carving and painting on the same surface are sometimes so marked as to point to a conflict, and would indicate that painter and sculptor were two separate individuals.

The entire work of painting, laborious as it seems, was re-attempted from time to time, though not so often as the exterior decoration of the temple. While in the Chac Mool Temple there is only one coat of paint, thus bearing testimony to the short use of the struc-

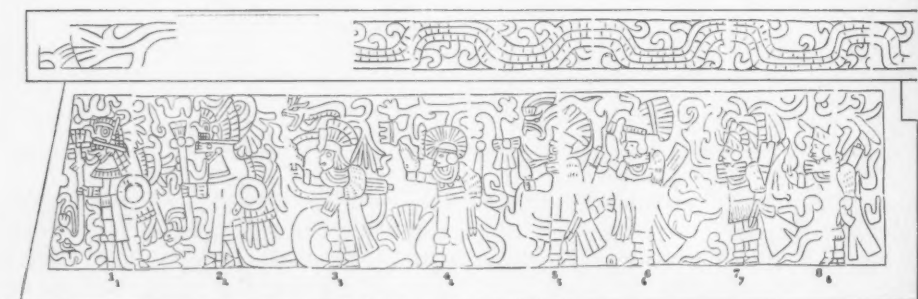
ture, numerous coats are still in place in the Warriors Temple and the Northwest Colonnade. Seventeen can be counted on the dais of this colonnade. Some incrustations were buried under this process of successive repaintings (dais, North Colonnade) and preserved until revealed by the disappearance of some of the coats of paint after exposure. Painted eyes were found in one such instance, concealing the original incrustated shell eyes, thus demonstrating that the existence of the latter had been forgotten by the time the last coats of paint were applied.



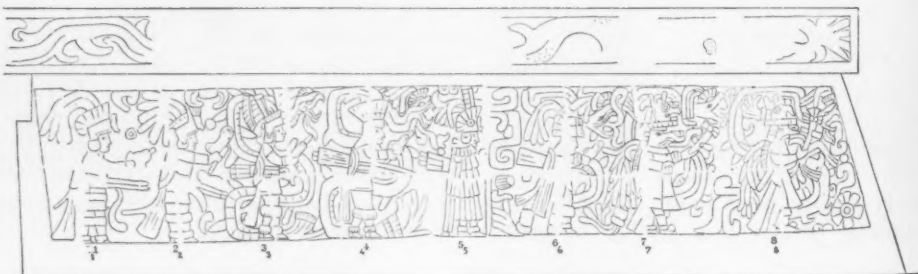
DAIS. NORTH COLONNADE. SOUTH SIDE. WEST PART.



DAIS. NORTH COLONNADE. SOUTH SIDE. EAST PART.



DAIS. NORTH COLONNADE. EAST SIDE.



DAIS. NORTH COLONNADE. WEST SIDE.

THE TEMPLE OF THE WARRIORS MURALS

By ANN AXTELL MORRIS

Staff Artist, Chichen Itzá Project, Carnegie Institution of Washington

Before excavation of the Temple of the Warriors, traces of paint were observed upon a few stones that had been torn out of the eastern slope by the roots of a fallen tree. This circumstance gave rise to the hope that mural paintings, few examples of which had come to light in the Maya area, might have been preserved in the mound. Such paintings were known to have existed originally in great numbers upon the temple walls and in the houses of the caciques, as their presence was often recorded by the early Spanish invaders.

The quality to be expected in Chichen Itzá was presaged by the magnificent fragments extant in the Temple of the Tigers and in the Monjas. Unfortunately, when the ruins were rediscovered in the nineteenth century, the explorers were so overpowered by the grandeur and mysterious magnificence of the buildings that they paid slight regard to such minor features as paintings. Meanwhile, forest growth, vandalism and the devastating fluctuations of an alternating wet and dry climate destroyed almost every known trace of this so perishable art. In particular, this is to be deplored because through such a medium, lending itself in all facility to informal expression, lies the only hope of obtaining familiar, intimate glimpses of the life of the people.

The extracts which follow are taken from Mrs. Morris' section entitled Murals from the Temple of the Warriors and Adjacent Structures in the Temple of the Warriors volume.

IN forecasting the possibilities for the recovery of murals, standing walls seemed to offer the greatest promise. But herein the obvious was deceptive. Not many of the walls remained to a height that would have brought them to the level where pictorial detail was utilized for embellishment. And from those that did retain this altitude almost all plaster had been eaten off by the action of tree roots and surface moisture. However, the vast majority of the painted walls had collapsed inward and were so deeply buried that many of them retained their film of plaster and its colored finish.

From the many disarticulated elements taken from the debris, it was possible to reassemble several large mural scenes with close approximation to their original appearance. In addition to these groups, some four hundred separate stones provided a veritable depository of detail of human types, ornaments, dress, animal life and landscape.

Later excavation in the buried Chac Mool Temple and the Northwest Colon-

nade revealed entire walls which were practically intact, due to deeper interment. Taken as a whole, then, for the study of the little known art of fresco painting, the accumulation of painted material from the three structures possesses a value second to none thus far discovered on the American continent.

Owing to the fugitive character of the frescos when subjected to changes of atmosphere, an immediate study was imperative. The copying of these stones was undertaken by hand, because repeated trials proved that photography was distinctly inadequate.

Many of the paintings were so badly destroyed that a magnifying glass had to be applied to the surface to catch the elusive bit of line or fleck of color which established some definitive detail, while the camera's trick of registering light and shade at the expense of color caused the breakages of plaster to be emphasized out of all proportion to the pattern. The fading, due to fluctuations of humidity and temperature, and the uniform values of even the best-preserved colors, presented a baffling

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problem to the photographer. Even experiments attempted with color photography failed entirely to record the true value of the pigments.

The necessity for a more adequate record was evident, and water-color was hit upon as being the medium best calculated to retain the quality of the originals. Great pains were taken to produce exact copies, uninfluenced by the personal equation or by the slightest subjectivity on the part of the copyist.

In order to achieve this result, careful tracings of every stone were made upon transparent paper. These tracings were then transferred to other sheets, after which the colors were reproduced directly from the model.

When it was thought that numbers of the disarticulated stones might be fitted together, the several possible blocks were first copied individually and the paintings, which could be handled with far more facility than the cumbersome stones, were then shifted about until adjusted to their proper places. After this process of allocation was completed, when necessary, drawings of the great scenes were reduced to a reasonable scale. No such reduction was employed, however, throughout the greater part of the work. Copying in full size from a direct tracing was considered to give the most faithful reproduction obtainable, since it removed the opportunity for the slight deviations and distortion of line which might have taken place in redrawing to a reduced scale.

The wall upon which the Maya artist worked was of limestone of various degrees of porosity, shaped into blocks of an average size of about 23 by 36 cm. When dressing these blocks, the quarryman seldom attained a surface that was a true plane. In cross-section, the exposed surface of nearly every stone is

slightly convex, having a raised center and depressed margins. The function of the plaster coat was to overcome the unevenness of the stone surface. Hence, the stucco was relatively thin over the centers of the stones and thick toward the edges and along the lines of juncture.

Therefore, over the latter areas, the plaster coat possessed sufficient inherent strength to peel off in large flakes instead of cracking neatly to follow the joints as the walls settled. This will explain the fact that so many of the stones have painted centers and bare edges; the only exceptions are those which, owing to inequalities of contour, were plastered thinly to one or more of their margins.

The plaster is white in color and made up of lime and *sascab* or the fine "white earth" used in Yucatan in place of sand. It was troweled to an excellent surface, which, at times, was almost of glassy smoothness. There is a possibility that the artist himself attended to the final surfacing of the wall in order adequately to prepare it for his paintings.

The coloring matter, either in powder or in the form of highly concentrated liquid, was mixed with various media before application to the walls. One binding medium appears to have been a highly agglutinative substance of such viscosity as to interfere materially with the uniform mixing of the pigment. This condition resulted in an uneven application of color, causing it to lie in a streaked fashion upon the walls. The alternate ribbons of self-color reveal that the medium was a fairly translucent, yellowish white, with considerable body of its own. This substance was employed throughout the Temple of the Chac Mool.

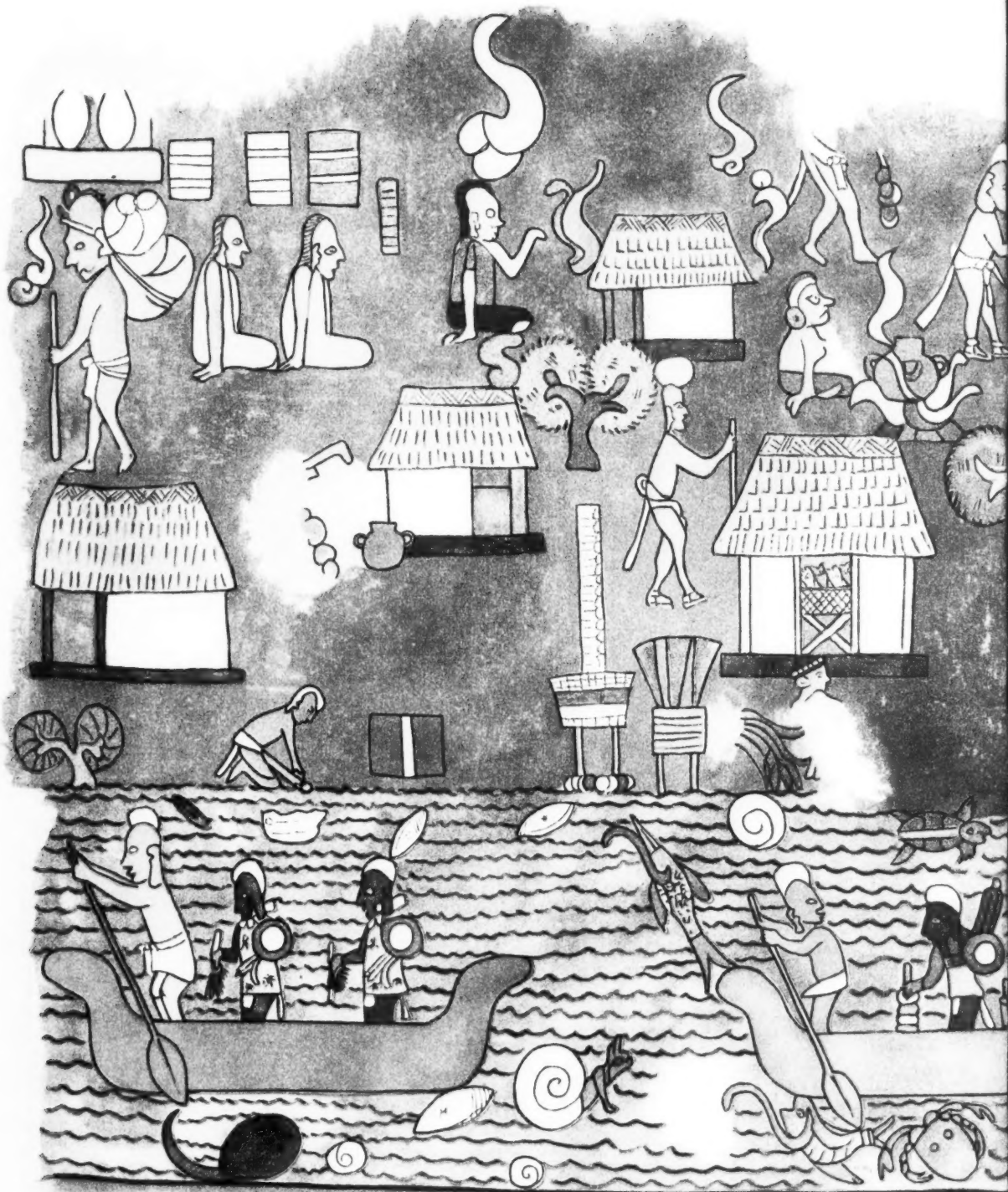
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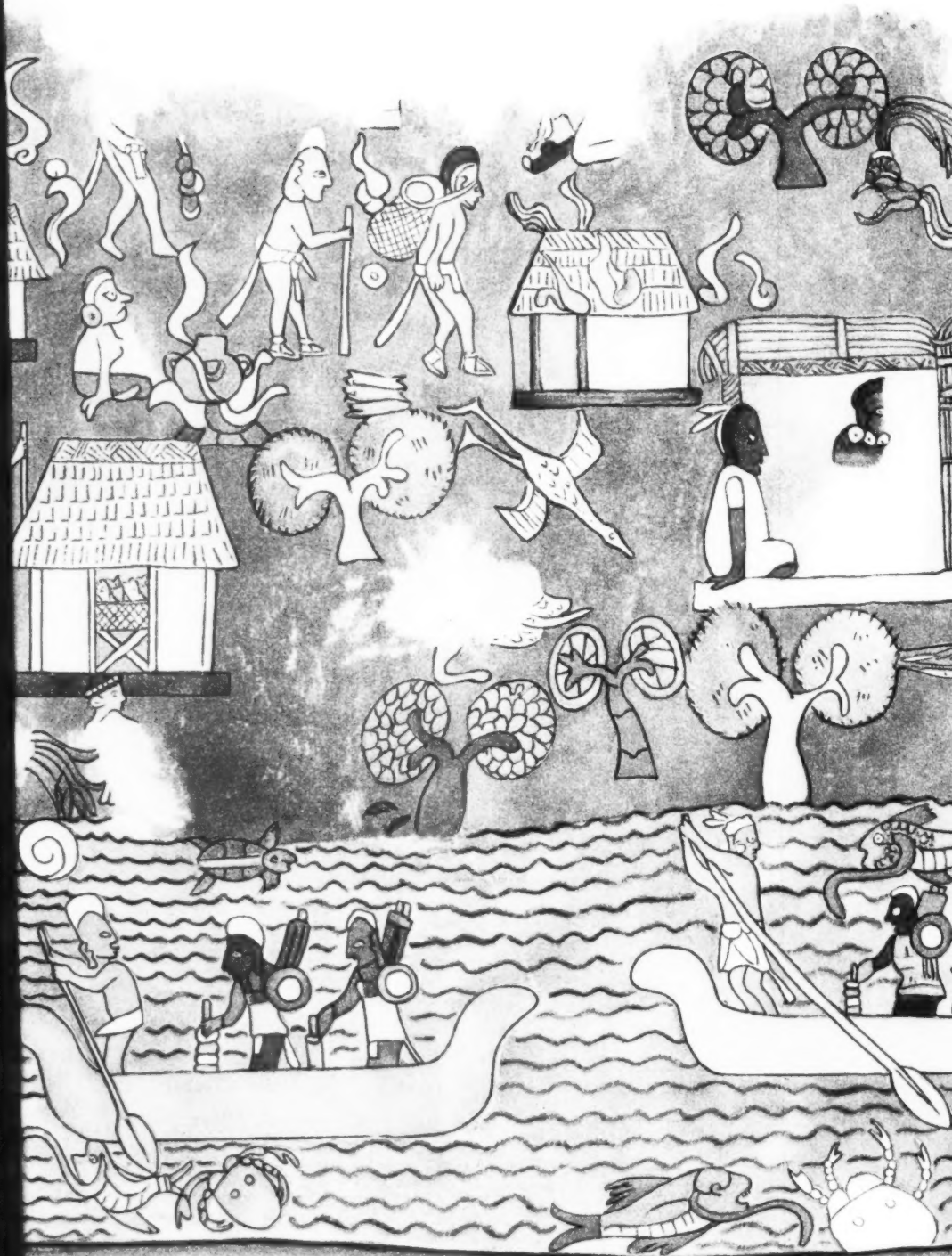
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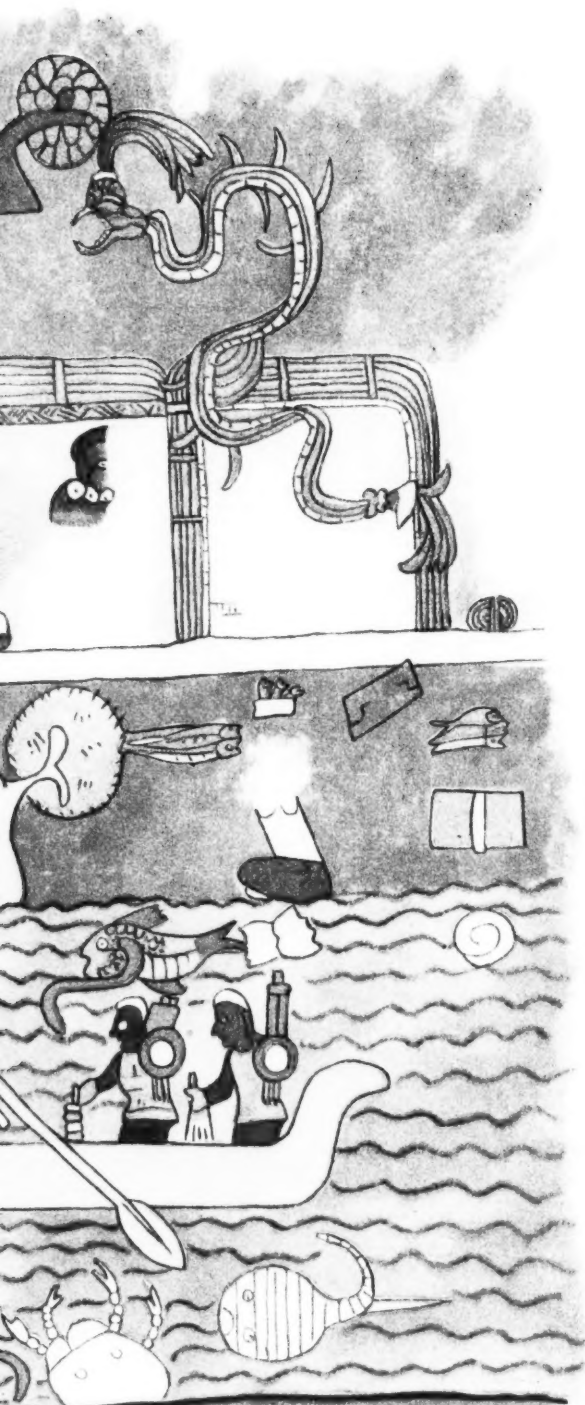
A MAYA SEA COAST

This is a reproduction of a painting originally executed on an inner wall of the Temple of the Warriors. Fragmentary whole a staff artist made a faithful copy in color. This is offered as an example of the art of the New Empire attitudes. The original mural was about 9 feet high and 12½ feet wide.



A MAYA SEA COAST VILLAGE SCENE.

of the Temple of the Warriors. Fragments of this mural were found in the temple debris by the excavators. After these fragments were put in place, the scene was a typical example of the art of the New Empire period which was characterized in part by interest in depicting scenes of everyday life.



avators. After these were pieced together into a con-
necting scenes of everyday life and people in dynamic



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A second solvent, which may have been only a thinner solution of the first, or with equal probability an altogether different substance, combined smoothly with the colors and was neither very thin nor unduly glutinous. It was used for the greater part of the paintings in the Warriors Temple and Northwest Colonnade.

The third variety, evident in one small section in the Temple of the Warriors, is extremely fugitive. One gathers the impression that it was nothing but clear water mixed with dry color, which, after the lapse of time and a final complete drying, was apt to flake off in a powdery form, leaving the original plaster background clean and smooth. The use of some arrestive substance, such as varnish or ambroid, has been absolutely necessary for the saving of these particular colors after they were taken from the earth, and has proved of value in the retention of the original brilliancy in all the frescos.

The problem of the colors is even more involved, for while their derivation can be determined, in part, from chemical analysis, questions of mixtures and variations of tone have to be solved from the general aspect of the paintings.

Time would seem to have wrought no essential changes in the appearance of the better-preserved murals. Each tint retains an isolated character of brilliancy and at the same time merges into the general tone of the whole with an even distribution of values. In other words, no one of the dyes seems to have been of a more fugitive character than the others, and where exposure has inevitably reduced their original strength somewhat, the process has been consistent throughout. On the whole, where conditions for their preservation have been most favorable,

the conclusion seems justifiable that when the stones were unearthed we looked upon a scheme of color decoration practically unchanged from the day when the painter, with a last touch, finally laid aside his brush.

A catalogue of the colors that were used will reveal a number of primaries out of which a large variety of intermediates were developed.

In general, reds are found varying from an opaque purplish tone near Indian red through a finely graded range of more transparent shades to a fiery orange. The deeper tones possess a tenacious permanence. A color, describable as copper-tan, rather near a burnt sienna, is used so frequently for preliminary outlining and is of such a fairly consistent quality, that it appears to be a primary, unmixed member of the Maya palette. A thick opaque pink, present only in the Chac Mool Temple, was obtained by mixing these reds with white. The variation in this pink from the distinct mauve of the frescos to a salmon, as found on the columns, is explained by the predominant shade of the original red which was utilized.

The yellows, although probably all derived from ochrous earths, range from those having a pale greenish cast to a dark hue near orange. A dark brown probably results from mixture of ocher with black.

Blue, an extraordinarily vivid shade similar to Prussian blue when it is presented on an opaque background, takes on an equally intense although clear cerulean tone when applied directly to white plaster. That these two shades are probably one and the same color becomes evident when the process of weathering is seen to reduce the former to its more transparent complement.

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The origin of green is a puzzle. The wide variation from light olive almost to black, and the lack of any uniform stable, base tone, suggest that it was produced solely by mixing some of the different yellows with blue, in varying quantities.

A pure black of great vividness is utilized for outline purposes; on the columns it is mixed with white to form a grey. In the Warriors Temple frescos, plain white plaster is utilized for the depiction of masonry temples, but an opaque, white pigment serves for various details of overpainting, such as tattoo or facial decorations. In the Chac Mool Temple, no reserved plaster was permitted, and the whites are rendered by paint which, usually, is not too pure.

As a whole, one is justified in drawing the conclusion that there was a variety of sources from which pigments could be obtained, and the innumerable minor variations signify that the tones were mixed afresh from time to time as the work progressed.

The preliminary step taken by the Maya artist involved a general lining-in of the figures later to be filled with solid colors. A reddish copper-tan tint was almost invariably selected for this purpose. Details were omitted, as well as certain simple, obvious effects, such as the black waves in marine scenes.

It was at this moment that the main problems in composition were solved. The field selected by each painter was divided into several large units, in accordance with whatever plans he had in mind for landscaping, such as the separation of the water scenes from the land or making the distinctions between red background and green.

Within these divisions, the artist sketched his individual figures in bold,

copper-colored lines, courageous in conception, then filled the outlines with flat contrasting colors and, finally, as a finishing touch outlined them a second time in vivid black. Most of these preliminary guide lines were destined to disappear when the picture was completed, but a few remained, affording interesting evidence concerning the painter's technique.

On account of the marked discrepancies which sometimes exist between the two, there is some doubt as to whether the second outlining was always undertaken by the same hand as the first. On repeated occasions the black would appear to have been put on by someone who did not feel much responsibility toward the first draftsman's work, or else the man himself overlaid with a sublimely carefree attitude toward his own original drawing.

After the preliminary framing was completed, the outlines were filled with brilliant, flat colors. There was no reproduction of light and shade, nor any attempt at accentuating or fading the pigments in order to produce the effect of modeled relief. The lack of such contrast, as well as the closely related values of the colors, is excellently adapted to maintaining unbroken the continuity of the plane surface. The architectural tenet of retaining a flat, unaccented wall surface was carried by the Maya artist to its logical conclusion. In principle, whatever contrast was necessary for design was indicated by a change in color alone.

In the selection of the colors used in delineating the details of these paintings, convention and realism are curiously mingled. A color language was established, wherein a certain hue was invariably employed to describe a particular object, just as in spoken idiom

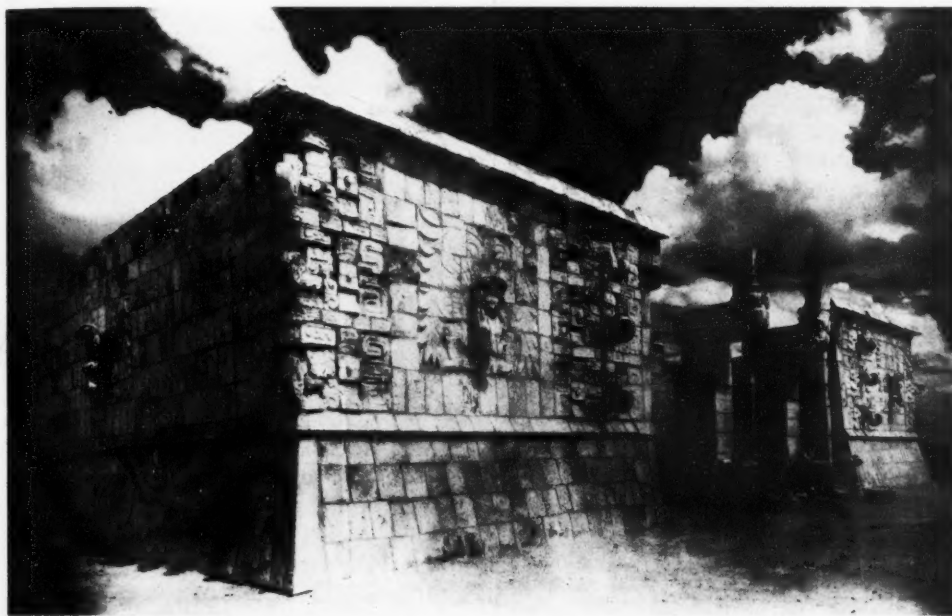
ART AND ARCHAEOLOGY

a single word suffices to symbolize a complete trend of thought.

According to this color symbolism, water is expressed by a blue ground, crossed with horizontal, wavy lines; and thatched roofs by a yellow ground, striped with thin, black, L-shaped lines and capped by a strip resembling bas-

concepts such as the plumed serpent and the fish, utilize purely arbitrary color formulas established by centuries of tradition and habit.

The importance of color symbolism can not be too greatly emphasized in the study of Central American cultures. Each locality and period would seem



FAÇADE, TEMPLE OF THE WARRIORS, SHOWING SERPENT COLUMNS WHICH FORM TRIPARTITE ENTRANCE.

ket weaving. Feathers are green in color; masonry structures are white; certain typical garments are constantly one color, while other styles are as consistently of a different hue.

Some of these symbols are true to fact, as in the case of white masonry and the green plumes which were, presumably derived from the tail of the quetzal bird; some partake of the nature of impressionistic approximation, as the treatment of the sea and the thatched roof; while a few, which depict formal and more or less imaginary

to have developed its own conventions and rigidly adhered to them—a condition which enormously lightens the task of deciphering faded and fragmentary paintings.

The general purport of the painted scenes was limited to some extent by tradition, but much of the content was drawn from direct observation. Religious concepts and legend played their part. However, it is obvious that most of the painters' attention was caught by the pageantry of daily life. From a lifetime of association with the

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impressive ritualistic ceremonial of the city, and an even more complete knowledge of the recurrent details of daily occupation, they were provided with ample material for their work.

It is perhaps of interest to mention here certain observations on the relative importance of persons and scenes, as seen through the eyes of those who painted them. Men were almost the only humans represented; in both sculpture and painting there were few women and no children. There was no preoccupation with sex and no delineation of the intrinsic beauty of the human body, such as are to be found in the works of the Old World.

Taken as a whole, the composition of the scenes is extremely well organized. The plan is clear and precise, but at no time wooden; every figure is fairly instinct with life and adroitly placed in accord with subtle equilibrium. The drawing, at times, is more naive than skilful, but again one is often startled by the clever proficiency of the painters. They possessed a remarkably coordinated eye and hand which enabled them to sketch the continuous contours of their figures with a single flexible line, without hesitation or necessity of correction.

One feature common to all the compositions is particularly striking. At no time could the Maya artist of any period understand the contrast value of blank space. A vacuum was never so abhorred—anything and everything was crowded in to fill the spaces not covered by the essentials of the pattern. When pertinent devices were exhausted, scrolls for scrolls' sake were made to absorb whatever remaining space had chanced to be neglected.

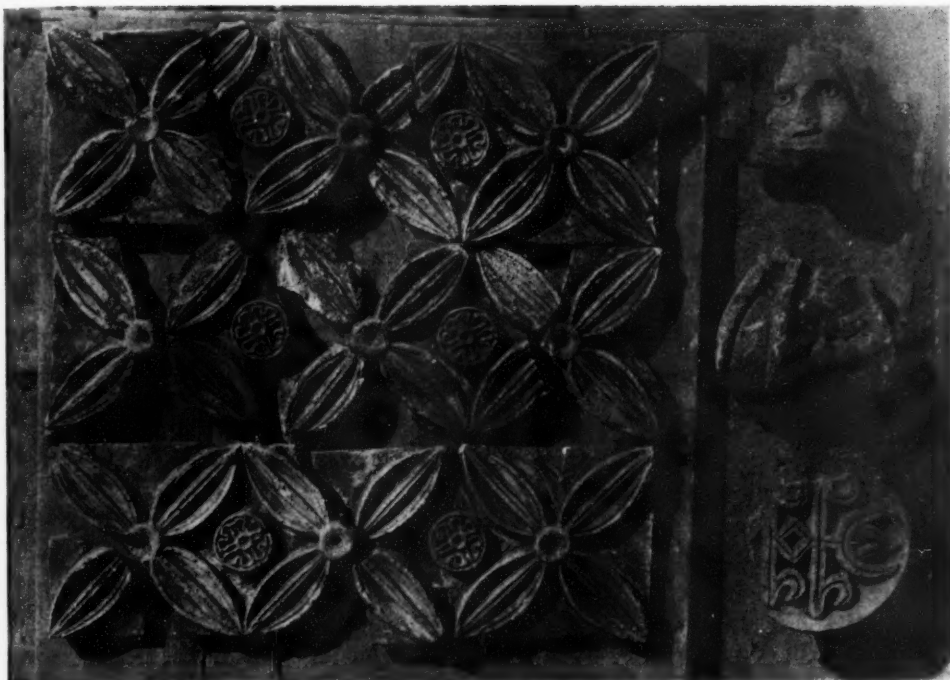
A mechanical artifice was employed,

similar to that of the Italian primitives, of expressing a receding background by an ascending vertical plane. Thus, the scenes at the top are to be thought of as being at a greater distance from the observer than those at the bottom.

The perspective to which our eye is educated today is atmospheric and involves the optical illusion of diminution on the receding plane. From this point of view, Maya work appears as childish ineptitude, until one realizes that, by further amplification of the idea, the artists not only expressed their own satisfaction with the device but carried it through to a conclusion, amazingly sophisticated and quite as logical as our own.

I refer to their technique of counter perspective, which is so excellently adapted to mural paintings that are executed on a large scale. Contrary to the rules of perspective, but in entire accord with the laws of optics, the figures at the tops of the walls were drawn to a scale distinctly larger than those on the lower levels. Since the striped dado runs from the floor to about 1.68 meters in height, the lowest figures in the scenic pictures begin at the average level of the eye. As the portrayal recedes upward, the scale becomes gradually larger; and, although the distance from the eye increases, no change in size can be noted.

It may be said that the mannerism of Maya painting is a script that must be learned. But when the basic concepts upon which the art was founded are thoroughly grasped the frozen silhouettes melt into animation, and, in the remembered light of the old altar fires, appear to reflect again their one-time vibrant life.



SASSANIAN DECORATED PANELS.

THE FIELD MUSEUM-OXFORD UNIVERSITY JOINT EXPEDITION AT KISH: II

By HENRY FIELD

(Concluded from the May issue)

AT THE close of the season in March, 1928, the entire trench had been cleared down to approximately one foot above the present water level.

It is of interest to record the fact that in 1927 a sterile band had been found which covered the city at an approximate depth of forty feet below the surface of the mound. This stratum had been deposited by water and

it was later determined that about 3200 B.C. a local flooding of the river Euphrates, probably due to a severe winter followed by a rapid thawing of the snow in the northern mountains, had destroyed the city. This may well have been the Biblical Deluge. Another "flood stratum" was discovered at a lower level.

During the season 1928-29, Mr. Watelin was finally able to penetrate

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FLINT IMPLEMENTS AND SICKLE BLADES IN BITUMEN.

through the water and to reach virgin soil. A small trench was commenced and by means of baling operations with four-gallon gasoline-cans and a chain of workmen, the stratum below water level was reached. It is of particular interest to note that an entirely different culture was revealed during the course of this work. A very early type of pottery ware was found associated with flint implements of Neolithic types and small bone points. Although the area excavated was extremely limited it seems plausible to suggest, at least tentatively, that evidence of a Neolithic phase of culture existed at Kish prior to the earliest flood stratum indicated at about 4000 B.C.

From geological and archaeological data obtained by the writer during the Field Museum North Arabian Desert Expeditions, it seems plausible to suggest that the stony desert region which lies between Transjordan and the river Euphrates was once fertile and well-watered. Flint implements, both Palaeolithic and Neolithic in type, were collected from several hundred surface

stations. The implements which appear to be most recent from a typological point of view suggest a cultural relationship with those found just above virgin soil at Kish. I would like to suggest the following theory which is based on the recent archaeological discoveries.

When climatic variations over this region lessened the rainfall, the stream beds began to dry up and the semi-nomadic people were forced to become either true nomads such as the

modern Bedouins, or to move to a more watered area. The migrations may have been in one or all of three directions, namely, to the west into Palestine and Egypt, to the south into Somaliland, or to the east toward the Euphrates. I suggest that part of the population, still in a Neolithic phase of culture, moved eastward and founded the city of Kish beside both banks of the main stream



A JAR AND BOWL OF COPPER FOUND TOGETHER IN AN EARLY GRAVE.

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of the Euphrates. This straggling group was easily conquered by the well-trained and forceful Sumerians, who dominated and employed them as slaves. The Sumerian culture flourished and developed magnificently in the "Fertile Crescent" until, in its turn, it was also destroyed.

The excavations continued—through stratum upon stratum of buildings, accumulated debris and several feet of water—to a depth of approximately five feet below water level, and for the first time on record, virgin soil was reached in Mesopotamia. The total depth from the top of the mound was approximately sixty feet; this gigantic task bears eloquent witness to the engineering feats performed by the director of the excavations.

Among the objects taken out was a polychrome terra-cotta head portray-



SUMERIAN HEAD MODELED BY A CONTEMPORARY ARTIST
(FRONT).

ing a Sumerian, half natural size and belonging to the third millenium B.C. This is the only example of painted statuary known in Sumerian art. Many copper and stone objects were removed from graves and several hundred Babylonian and Sumerian tablets were unearthed.

The excavations continued from December, 1929, to April, 1930, under the supervision of Mr. Watelin. By means of an hydraulic pump the trenches were continued below water level. Examples of polychrome ware were found, as well as flint implements, many of them microlithic in size. The tablets found are archaic in script but do not show pictographic signs. Near the surface of Tell Inghara a small head of lapis lazuli was found and in the division of objects was allotted to Field Museum. Inscriptions on stone fragments and



SUMERIAN HEAD (PROFILE).

ART AND ARCHAEOLOGY



SASSANIAN HEAD IN GYPSUM.

several hundred tablets from different periods were sent to Professor Langdon to be translated and published in the Oxford Edition of Cuneiform Texts.

According to weekly reports from Mr. Watelin, two important discoveries were made during the latter part of the past season, which was concluded at the end of March, 1931. A magnificent Sassanian palace was found and partly excavated. This building contained a large hall of columns with several outlying rooms and smaller courtyards. A series of beautiful painted sculptures was also unearthed. The simplicity of design combined with the complexity of motif bear eloquent testimony to the artistic attainments of the Sassanian period. A large portion of these sculptured panels was allotted to Field Museum and is now on its way to Chicago.

In the lower levels Sumerian objects were unearthed and the thick walls of an extensive building were disclosed. It appears that several rich tomb-groups continue underneath the outside walls of the larger temple-tower or ziggurat, which would suggest the desirability and necessity for the removal of the ziggurat itself, which will indeed be no small task.

Mr. Watelin plans to recommence work at the beginning of December and it is hoped that he will discover the royal tombs, which should contain untold treasures both in gold and silver objects, statues in stone and inscriptions which will add to the historical knowledge already obtained by excavation.

Fascinating as the archaeological work itself is, the geographic and human surroundings of the excavator are also of the keenest interest. One wonders often, too, just how far the desert, village and city life of today resembles the activities of the remote past for whose records we are striving so earnestly. That there must be some similarity is self-evident, and the accu-

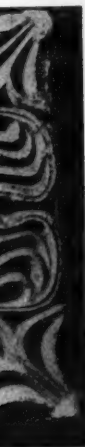


SASSANIAN SCULPTURED PANEL.

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RECONSTRUCTED GATEWAY INTO SASSANIAN PALACE.

ART AND ARCHAEOLOGY

rate observations which can be made on the present-day people serve to some extent as a basis for our assumptions as to the life of ancient times. Today in the Kish area irrigation canals bring the water from the Euphrates to within five hundred yards of the Tell-el-Ahaimir ziggurat. It is thus possible

Hillah patrol the area and are hated and feared by the Arabs. It is not uncommon to see a bedraggled Arab running to prison between two mounted police, who encourage his athletic efforts with kicks in the back or with the butts of their rifles.

The leading sheikh in the Kish region

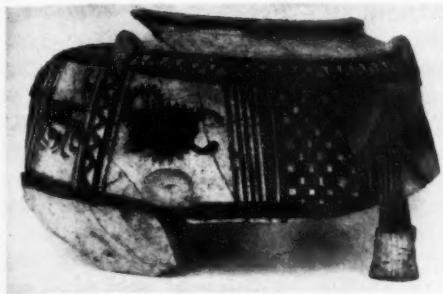


SASSANIAN SCULPTURED PANEL SHOWING A LION FIGHTING A BULL.

for the Arab fellahin or agricultural laborers of the neighborhood to practice some rudimentary tilling of the soil. Their villages are composed of small mud-huts, partially protected against storms of rain and sand by camel-thorn fences. Each village is ruled by a sheikh, who is entirely responsible for the good behavior of his tribe. Native mounted police from

is Miniehil, who lives in a mud village about two miles to the west of Tell-el-Ahaimir. While visitors are still about a mile from the village the dogs begin to bark, and as we approach the outskirts we are met by a crowd of children anxious to see the Europeans. Within low mud-brick walls is a courtyard in which are horses, sheep and chickens. Behind several of the low

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NATURALISTIC DESIGN ON A PAINTED JAR FROM JEMDET NASR. DATED BEFORE 3500 B. C.

camel-thorn fences which surround each hut or group of huts, Arab women, dressed in long, dark-blue cotton garments, peer out. Several women are engaged in making bread. They squat before a hole in the ground, which acts as a primitive oven. The flour is kneaded into balls and eventually rolled flat and cooked over the fire. This is the local form of *chupattie*, which, together with dates, forms the staple diet of the Arabs. On the outskirts of the village a woman is drawing water from a well, carrying a child on one arm and a heavy bucket with the other hand. As we approach the woman covers the lower part of her face, following the age-old Mohammedan custom of veiling the face in the presence of men.

The young girls, who are curious, crowd around and form an imposing group of onlookers as we pass. Many of them wear golden nose-rings, as well as bracelets and anklets of silver. The children are ragged and unwashed, and their parents have no conception of sanitary conditions. Whenever a child cuts himself the fond mother or father will immediately rub some dirt from the ground into the wound, at the same time calling on "Allah, the merciful, the compassionate" to heal the wound. Since the ground in the neigh-

borhood of the village is polluted by the animals and infected with numerous germs, it can be readily understood that among these people there is a high mortality rate. Many of the children suffer from sores around their eyes, which later develop into cataracts and finally result in blindness.

The men of this village are extremely friendly because the Expedition is their source of revenue. Sheikh Miniehil's camp supplies the majority of the workmen for the excavations.

In the courtyard is a mud-hut larger than the others. In the center of the floor a charcoal fire burns, and since there is no chimney, the atmosphere is heavily charged with smoke. As we enter the door everyone stands up in our honor, and the Sheikh steps forward to greet us, as we all mutter the general forms of Arabic salutation. The Sheikh begs us to be seated beside him, and



PAINTED POTTERY FROM JEMDET NASR.

ART AND ARCHAEOLOGY



A THERIOMORPHIC VASE IN THE SHAPE OF A PIG.

coffee is brought his guests. There are numerous inquiries after our health and fervent prayers to Allah that we may remain always healthy and beget many sons. The coffee is served in very small cups, and, as with the Bedouins, it is necessary to make as much noise as possible in drinking, to show true appreciation. The Sheikh is much revered since his return from a pilgrimage to Mecca. The faces of the old men of the tribe, who squat on the floor around the hearth, are a picturesque index of native character.

One evening Sheikh Miniehil invited us to visit his camp to witness the dances of a famous dancing girl. She was twelve years of age, and was accompanied by three men who played various musical instruments during her dances. After we had loudly drained several cups of coffee, this girl began to dance to the accompaniment of several drums and a single one-stringed instrument resembling the Bedouin *rababa*. During the dance she would stop and kneel before one of the members of the audience, who would spit on a coin and stick it on some part of her face. As the dancing continued and the men became more excited she would have five or six coins sticking to various parts of her face, and she would attempt to stand up and continue to dance without letting the coins drop

to the floor. Feats of this kind were wildly applauded. The dance continued for about an hour, and the girl became intoxicated with the sums of money which she received. Suddenly she stopped before the eldest son of Sheikh Miniehil, begging him to give her a large coin. He took out some money and put it in her hand, but she did not think this was sufficient, and with a wild cry threw it into his face. The young man picked up a thick stick which was lying beside him and struck her several times on the back, as she lay groveling on the floor in front of him. Complete confusion ensued, and the old Sheikh had the greatest difficulty in restoring order. The girl refused to dance again, and lay sobbing on the floor. It did not seem wise for us to remain, and after a few minutes we took leave of our host and set out for our camp.

The work of excavation commences at seven o'clock in the morning and continues until four-thirty in the afternoon, with an hour at noon for luncheon, or *bydos*. About six-thirty A. M. the army of workmen passes the camp on its way to the excavations. At seven o'clock one of the scientific members of the expedition gives the signal for the commencement of work. It is generally cold at this time of the morning, but by nine o'clock the golden rays of the sun have warmed the plain.

There are two divisions of labor employed by Mr. Watelin. The members of the first use a light railway on narrow-gauge rails which works down to the level of the plain. Each gang of workmen is under the direction of one man who is responsible for bringing his men each morning. The size of the gangs varies, but under normal conditions each railroad gang or *jokha* consists of one pick-man, two shovel-

ART AND ARCHAEOLOGY

men who throw the earth into the trucks, two men who push the trucks to and from the dumping-ground, and two men at the dumping-ground to keep the tracks clear. The eight railroad gangs are superintended by a foreman or *rais* who continually encourages the men to work harder and is responsible for keeping order among them.

Laborers of the second division use basket-boys instead of railway trucks to carry the earth to the dumping-ground. Each of these gangs is composed of a pick-man, two youths who scrape the earth into the baskets with a kind of hoe, and six or eight basket-boys, according to the speed at which the pick-man can work and according

to the distance to be traversed to and from the dumping-ground.

The *rais* in charge of the basket-boy gangs is Hassan Jedur, who was employed for eighteen years by the German archaeological expeditions at Babylon before the Great War. He is an expert excavator and his advice is often solicited.

The basket-boys are from seven to twelve years of age, and are a most interesting group of children. It is always of interest to note that the Arab children are brighter and more intelligent on the average than the middle aged men. Their intelligence appears to increase until they reach the early twenties, then to decrease to a relatively low mean standard. These



TWO LARGE GRAIN JARS.

ART AND ARCHAEOLOGY

children chant and sing at their work and thus help to pass the time more rapidly. In the early morning they are too cold to sing, and it is not until the warm sunshine has penetrated the deeper portions of the trenches that the work proceeds with the customary interest and rapidity. Any unusual event calls forth cries of excitement from the children and is usually accompanied by an impromptu song. For example, some visitors come from Hillah to examine the excavations. As soon as their car is visible the children will shout and sing that an automobile is approaching, and the refrain of their song will include some reference to its color or size. An old man with an ancient donkey brings drinking-water to the trenches every hour. The donkey carries two leathern waterskins, from which a large earthenware jar or *hib*, standing in the middle of each trench, is refilled. Each time the water-carrier enters the trench the children sing some songs about him, and make rude remarks about the old *mutti* or donkey, whose only reply is to move his ears lazily backwards and forwards. Occasionally a jackal, fox or hyena will pass near the excavations and the children immediately respond with screams and shrieks of excitement.

Early one cold morning several gangs were working on the upper levels of a mound. Suddenly one of the pick-men unearthed the head of a large sleepy snake. Wild cries of *Haiya! Haiya!* rent the air, and we rushed to the scene. The snake slowly crawled out of its lair and dreamily moved its head from side to side. The pick-man landed a well directed blow on the head of the snake and after numerous convulsions it finally lay dead. The snake measured four feet in length and was preserved in arrack for shipment to Field



A COPPER STAND CONTAINING A NARROW STONE VESSEL.

Museum for identification. Arrack is the local intoxicating beverage, which contains a high percentage of alcohol. This snake was harmless but nevertheless caused considerable confusion among the workmen. It was identified by Dr. Karl P. Schmidt as *Spalerosphis diadema* (Schlegel).

The work of excavation proceeds each day until noon, when the director

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uplifts both arms and cries "*Bydos*". This word causes instant pandemonium. The children throw their baskets in the air and rush for their packages of food. This consists entirely of dates

and unleavened cakes, which form their midday meal. Meat is rarely eaten, owing to its expense. The scene during the noon recess is picturesque, with no dust rising from the trenches, no songs filling the air, and separate groups of men and children squatting on the floors of the trenches in sheltered nooks, enjoying to the fullest this hour of rest and recreation. The scientific staff return to the camp at Tell-el-Ahaimir for luncheon, taking with them in the automobile fragile or particularly precious objects, carefully wrapped in cotton wool.

Work is resumed at one o'clock and continues until four-thirty, when *bydos* is again called, and within two minutes the work has entirely ceased and the men and boys are hurrying to their homes. Many of the two hundred workers pass Tell-el-Ahaimir on their way to Sheikh Miniehil's camp, and the long line is headed by running boys who reach camp only a few minutes after the scientific staff, who return in the automobile.

With the exception of extremely precious objects, which have already been taken by the director in the car, each pick-man brings all the finds excavated by his gang to Tell-el-Ahaimir camp. The director gives *baksheesh* or rewards for objects found. This encourages careful excavation and tends to prevent thefts. A small cylinder-seal, for example, brings as large a reward as a huge object, unless this is of paramount importance. The seal could be secreted in the folds of the flowing Arab robes and sold at some later date to a Jewish dealer, while a large object could not be stolen without attracting attention from the *rais* or one of the scientific staff of the expedition. A rupee (32 cents) is given for a good cylinder-seal, and fractions of



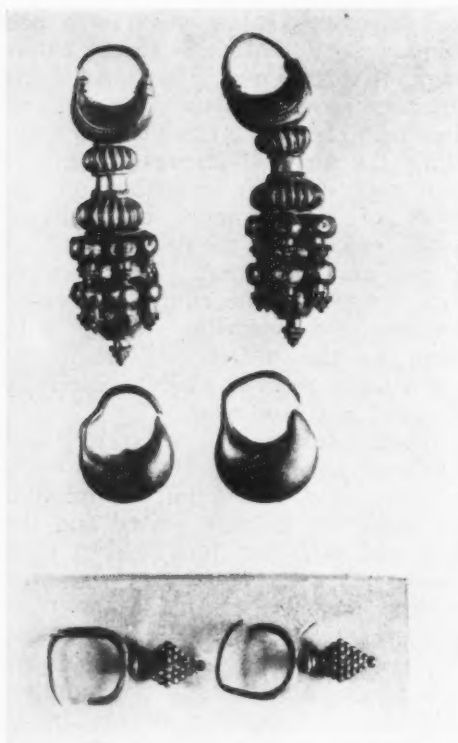
HANDLE OF A DAGGER.

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GOLDEN EARRINGS WORN BY WOMEN AT THE COURT OF KING NEBUCHADNEZZAR.

that amount are paid for objects of lesser value. The basket-boys are encouraged to bring everything they find to camp. They are usually rewarded with a one anna coin, which is worth about two cents of our money.

Friday is the Mohammedan day of rest and to conform to local wishes the excavations cease for that day, instead of during the Christian Sunday. Thursday afternoon work stops at four o'clock to allow time for paying the workers. The daily wages are as follows: The pick-men receive one rupee (32 cents) per day; the shovel-men 12 annas (24 cents) and the children eight annas (16 cents). The men are paid off by gangs and after much haggling and

bickering they leave for their homes.

When the last gangs have received their wages, we watch them disappear into the west. The shrine of a saint stands out in bold relief against the variegated hues of the sky. The sun, which appears as a flaming disc of red, hangs for a moment above the horizon, as if bidding goodnight to the ancient Garden of Eden.

The scientific members of the staff write up their notes, number and label specimens, develop photographs and attend to the many duties which face a scientist in the field before his day of work is actually done. Dinner is served at seven-thirty P. M. and afterwards each member retires to his mud-hut and finishes up his work before retiring.

At the close of the season, about the first of April each year, the Director of Antiquities of Iraq visits Kish to select a share of specimens for the Iraq Museum in Baghdad. The remaining objects are shipped to Field Museum of Natural History and the Ashmolean Museum at Oxford. These objects are packed in cases and are shipped to Chicago and Oxford respectively.

The entrances to the mud-huts are walled up with mud-bricks and the camp is entrusted to the care of Sheikh Atiyeh, who is rewarded financially for guarding the camp until the following season, which begins sometime in November.

In conclusion we must recall with grateful pleasure the never-failing co-operation of the British authorities, the courtesy of King Faisal and his advisers, the local authorities at Hillah, and last but not least, the Arab workmen, who labor cheerfully and diligently to wrest the ancient treasures and secrets of their ancestors from the alluvial plain lying between the Twin Rivers.

NOTES AND COMMENTS

HOW WAS RUPESTRIAN ART FIRST PAINTED?

ART AND ARCHAEOLOGY recently received an interesting, if debatable, suggestion from Monsieur J. J. Taudin Chabot of La Perreyre, Lausanne-Chailly, Switzerland, with regard to rupestrian art. The communication follows in full.

M. Taudin Chabot writes: "There is mystery for us in this art of some thirty to fifty thousand years ago. First of all we must admit that the designs were drawn in a darkness but faintly relieved by the flickering torches of those prehistoric days. Again, our wonder is stirred at finding designs upon the walls of corridors so cramped the artist could hardly have had any perspective of his work.

"Accordingly, I should like to ask whether these are really hand-drawn pictures. May they not rather have been traced around flat patterns with crude pencils, and thus required neither much light nor any perspective for their production? Certainly, the outlines once sketched, the filling-in with color and the finishing of the design is relatively simple as compared with original work.

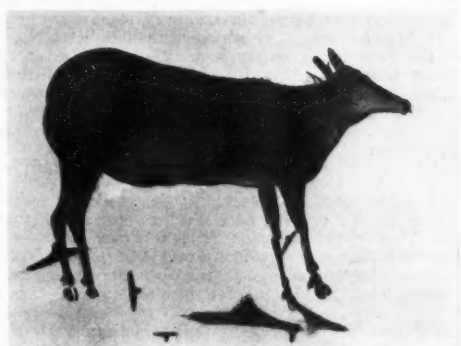
"This also, I believe, explains why some of the drawings cross others. In the uncertain light of the caverns the artist may well not have noticed the presence upon the section of wall where he laid his pattern, of a picture already completed.

"As to the patterns, these were undoubtedly executed in daylight, and then, in all probability, put in a storehouse as wooden fetishes kept in stock, so to speak, for placement at the entrances of the caves during the hunting season as symbols of the animals the people were accustomed to see all about them and to hunt. It is clearly for this reason that the human figure is practically never encountered upon the cave walls.

"If my suggestion coincides with the facts, it has the advantage of giving us a new view of these ancient witnesses of the oldest art we know, since it represents them as gifted with an even greater intelligence than we have hitherto assumed they could possess. Indeed, we may even regard them as the forerunners in a sense of the process of printing, since then so marvelously developed."



BUFFALO AND DEER FROM ALTAMIRA CAVE.



DEER, FROM ALTAMIRA CAVE.

REPORT OF THE AMERICAN SCHOOL OF PREHISTORIC RESEARCH FOR 1930

The tenth annual session of the American School of Prehistoric Research opened in Paris on July 1, and closed in Prague on September 3. Twelve students, ten men and two women—all but two of them graduate students, were enrolled. J. Townsend Russell, Jr., a former student of the School, assisted the Director, who also had the assistance of two other former students after the group reached Czechoslovakia: V. J. Fewkes of the University of Pennsylvania, and Robert W. Ehrich of Harvard University.

The itinerary included parts of France, Spain, Switzerland, southern Germany, and Czechoslovakia. Digging was done in three sites, representing various culture levels: thirteen days in the Abri des Merveilles (Dordogne), with three horizons—two Mousterian and one Aurignacian; three days in the cavern of El Pendo (Santander), Spain, with four horizons—Mousterian, Solutrean, Magdalenian, and Azilian; and seven days at Homolka, near Prague, with late Neolithic and early metal cultures.

This gave the students a wide range of experience not only in the art of digging, but also practice in the determination of specimens from various epochs as well as from various phases of a given epoch. It was our good fortune at El Pendo to help in the discovery of two works of art dating from the Magdalenian Epoch—a stag engraved on bone and a horse, likewise engraved on bone.

The actual digging was supplemented by visits to fifty pre-historic sites representing practically every phase of prehistory and by the study of museum and private collections. Coincident with the digging and the visits to sites and museums, forty-two conferences were given—eleven by the Director and thirty-one by foreign specialists and by certain of the students.

During the spring months our School dug jointly with the British School of Archaeology, Jerusalem, at the cave of the valley near Athlit, and south of Haifa, Palestine. This was our second season at this site. Miss Dorothy Garrod, representing the British School, was again in charge; our two representatives were Dr. Martha Hackett of Mount Holyoke College, and

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Theodore D. McCown of the University of California. This second season's excavations yielded some 20,000 specimens dating from the Mousterian, Aurignacian, Mesolithic, and later epochs. Joint excavations will be resumed here during the spring of 1931.

In March, 1930, there was published Bulletin No. 6 of the School (43 pages), containing the Director's report and Miss Dorothy Garrod's paper entitled: "The Paleolithic of southern Kurdistan," which describes the joint explorations and excavations of our school and the Percy Sladen Fund (British) during the autumn of 1928.

GEORGE GRANT MACCURDY.

(A letter from Dr. MacCurdy just received states that Bulletin No. 7 has been recently issued, and that the School's program for 1931 is "even more expansive" than any previous one. "In place of one summer course as offered in 1930, we are offering two courses, each in charge of a former student of our School. As for expeditions, two representatives of our School are at present digging jointly with the British School in two prehistoric caves near the foot of Mount Carmel in Palestine. We are also planning to cooperate with Flinders Petrie in field work in southern Palestine."—Ed.)

THE NEW MEXICO CONSERVATION BILL

Two years ago, reports our contemporary *El Palacio*, of Santa Fe, the New Mexico legislature had before it a bill for "the protection by law of the antiquities and all scientific resources of the State, including its plant life". The bill was amended after having been passed by both houses and then threatened with veto. Now it is before the legislature again in its original form, with the endorsement of such men as Dr. Edgar L. Hewett, Director of the School of American Research, and of President Zimmerman of the University of New Mexico, as well as of the State Federation of Women's Clubs. So far as possible, House Bill 124 is copied from the federal statute, and provides not only for the conservation of monuments but for the licensing of investigators, the division of the finds, their distribution to organizations within the State, and the forbidding of their removal from New Mexico.

DATES FOR CARNEGIE INTERNATIONAL ANNOUNCED

The Thirtieth International Exhibition of Contemporary Oil Paintings, colloquially known as the Carnegie International, will open at Pittsburgh on October 15 and continue through December 6, 1931. After the exhibition at Pittsburgh the European paintings will be shown at the Baltimore Museum of Art, January 4 to February 15, 1932, and at the City Art Museum of St. Louis from March 7 to April 18, 1932.

The American section of the International will consist not only of paintings by artists who have been directly invited by the Institute to exhibit, but also of paintings submitted to a jury of five American painters. This Jury of Acceptance, to which any artist who is a citizen of the United States may submit, will meet in New York September 10, 1931, and in Pittsburgh

September 21. The Jury of Award, which will consist of three European painters and three American painters, will meet in Pittsburgh on September 22 to award the prizes. The usual Carnegie Institute Prizes will be awarded, and this year the Albert C. Lehman Prize and Purchase Fund will be offered again.

Homer Saint-Gaudens, Director of Fine Arts at Carnegie Institute, is now in Europe visiting artists and assembling paintings for the European section of the International.

THE ENCICLOPEDIA ITALIANA IN NEW YORK

Architects especially will be interested in the announcement that the important *Enciclopedia Italiana*, a work comparable with the Britannica and to be issued in about the same number of volumes, now has an office in New York City at 156 East 64th street. Nine of the 36 volumes of the work are already out, and may be inspected at the office, or prospecti illustrated in black and white and colors will be sent on request to interested scholars. The announcement declares that the illustrations give an admirable idea of the historic palaces, churches, mansions, convents, monuments, etc., while the text is designed to convey "a compendium of culture in all fields: art, science, literature". And, adds the letter from the publishers, "because of the richness of illustrations, this work is comprehensible even to those who are little familiar with the Italian language".

"AN OFFER"

41 Great Russell Street,
London, W. C. 1. Jan. 1, 1931.

Editor, ART AND ARCHAEOLOGY:

In order still further to stimulate the advancement of Oriental learning, I hereby offer the sum of £100 to the first student or scholar who can (within a period of three years from date of publication) decipher at least ten hieroglyphs of the Indus script, a signlist of which will be found in the pages of *Mohenjo-daro and the Indus Civilization*. The solution will be submitted to a small committee of competent scholars whose decision will be final.

ARTHUR PROBSTHAIN,
Publisher of *Mohenjo-daro and the
Indus Civilization*.

THE RIDER OF BAMBERG

Privy-Councillor Dr. Paul Clemen, Professor of the History of Art at the University of Bonn, who contributed the article on "German Cathedrals" to the February issue of ART AND ARCHAEOLOGY, has requested us to point out that the statement on page 82, that the statue on horseback in the Dom St. Peter and St. Georg in Bamberg, "is undoubtedly Conrad III," is not contained in the original German manuscript. It is, rather, an interpolation on the part of the translator.

BOOK CRITIQUES

Corinth. Results of Excavations conducted by the American School of Classical Studies at Athens. Volume IV, part 1. Decorated Architectural Terra-cottas. By Ida Thallon-Hill and Lida Shaw King. Pp. xii; 120. 48 figures, 5 color plates. Harvard University Press, Cambridge, Mass. 1929. \$5.

It is pleasant to see that the final publication of the American excavations at Corinth, which have been going on for more than thirty years—since 1896—is beginning to appear. This first volume to be issued (although labelled volume IV, 1) augurs well for succeeding volumes. It is beautifully printed on good paper, with an attractive red binding, many good illustrations and five magnificent water-colors of three antefixes and two simas by Professor Prentice Duell. Very little of the material is of any great artistic importance or adds anything very new to our knowledge of such terra-cottas but, since antefixes were first used at Corinth, it is well to have the finds so minutely catalogued and so well and conscientiously discussed as has been done by Mrs. Hill, who is very familiar with the literature on the subject. Miss King and Mrs. Hill had started on the task in 1900 when they were students in Athens, but Miss King was obliged by pressure of academic work to abandon the catalogue, which Mrs. Hill took over in 1924, studying all the architectural terra-cottas found at Corinth, a total of nearly seven hundred fragments. Corinth had an important terra-cotta industry and the recent excavations at Thermon and Calydon have revealed architectural terra-cottas with Corinthian inscriptions as well as plastic heads with a slip of fine Corinthian clay. It was Corinth which helped introduce such terra-cottas into Etruria. The large number of decorated architectural terra-cottas excavated at Corinth confirms the tradition of the city's activity in this branch of handicraft, for which her high repute endured throughout antiquity. Unfortunately the bad state of preservation of many pieces necessitates considerable sympathetic imagination for their study in order to picture the original condition, especially in the matter of color. Mrs. Hill continually talks about a black color. I wonder whether the Greeks ever really used black and if this color could not be an original dark blue or brown changed by the chemical composition of the soil or by time into black. I should be inclined to date such a sima

as Figure 30 with the ends of the palmette turning up, in the fourth century and earlier than Figure 31, with the ends of the palmettes downward, which might be of the Vth century. On P. 40 in note 2, 1.2, curved brackets should be used in place of square to denote abbreviations. There is no room on the stone for such restorations as the author gives.

Mrs. Hill has done a scholarly and valuable piece of work in tracing by means of the Corinth examples the course of this branch of ceramics from the sixth century B. C. through the time of the Roman occupation of Corinth.

DAVID M. ROBINSON.

The Mound-Builders. By Henry Clyde Shetrone. Pp. xx; 508. 299 figures, 1 map. D. Appleton & Co. New York. 1930. \$7.50.

The need of a recent textbook on the mounds has long been felt, especially by those engaged in the teaching of anthropology. But such a book is most difficult to write. It would have to assemble and digest what is known about thousands of remains, which date from widely different periods and were produced by peoples speaking different languages and having strikingly different religions and customs. The mound-builders were never a single people. It is evident that in this area there is not even such unity as in the pueblo-building Southwest. Furthermore, the chief mounds are at old centers of population, along the waterways, and it is certain that artifacts from the Gulf of Mexico found their way up even into the northern limits of this area. The mounds contain intrusive materials and burials from later times. The present book has been hailed in some quarters as the long looked-for general treatise on the mounds. But when we study the book we find that it aims at being both popular to a degree, and at the same time scientific; that is, it tries to embody two widely diverse fields at the same time.

Another equally difficult attempt, carried out throughout the book, is to throw mystery about the mound-builders—to paint them as a distinct vanished people—and at the same time to acknowledge that they were nothing but the ancestors of the eastern Indians. After careful reading, the book gives the impression that the author is trying to argue one way and believe another. He does not believe, to my satisfaction, in the mysterious

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mound-builder, but does not want to be an iconoclast. Read page 479, which tells who the mound-builders were. He would let us think that they have vanished, when they have not. He tells of the mound-builder smoking-complex and the mound-builder burial-complex. The mound-builders had many complexes. If a tribe from outside the area wandered in, it would adopt one of them, and a tribe having one of them, leaving the area, would relinquish its complex for one like that of the new neighbors.

Mr. Shetrone is director and archaeologist of the Ohio State Archaeological and Historical Society. He was long associated with the late Dr. William C. Mills in a careful study of various Ohio sites. The Hopewell and similar cultures in Ohio are what the author is best fitted to write about. Three-quarters of the book concerns Ohio mounds. The part which deals with the southern region follows Mr. Clarence B. Moore.

In Chapters two to seven the author covers the distribution and classification of the mounds and their construction and purpose. From this he branches off into (1) agriculture, (2) commercial activities, (3) working of flint and minerals; stone, bone, shell and wood; pottery; textile making; burials; art; tobacco customs (note the order). Chapters 8-19 take us on a tour of the mound area. The best part of the book is Chapters 8-13 of this section, which tell of the Ohio area.

After an introduction that serves to shed mystery and whet curiosity, he goes into the history and early literature on the mounds, which, as is well-known, did little but play up this same mystery and picture a mythical race. An examination of what has been done down to the present reveals the painful fact that the great bulk of mound exploration remains still to be done. Practically no scientific excavation, such as will be done in the future, has yet been attempted on the mounds. Their chronology is most difficult and has not even been begun.

In a brief account of the mounds of the Cahokia group he implies that they have been proved to be of a domiciliary nature. Such is not necessarily the case. Dr. Warren K. Moorehead on being asked recently what per cent of the artifacts and burials recovered at the Cahokia group belonged to the builders of the mound, said that only a few from one site could be with certainty so assigned. This brings out the fact that most works of a nature

similar to the mounds were used by later Indians for burials or as dwelling sites. For instance, the Cahokia, one of the five Illinois (Algonkian) tribes, were living on the Cahokia mound until well into the historic period. On page 344 he speaks of the Cahokia culture in Illinois, but he does not know what constitutes it. He says, following Moorehead, that 200 or 300 mounds may have existed at Cahokia—50 per cent leeway! Fig. 216 does not show the platform that is the beauty of the Cahokia mound; it gives an entirely wrong conception of it.

His conclusion is complex. He admits that his picture of the mound-builders is sketched in hurriedly and sometimes vaguely. He does not picture to just what definite knowledge the future study of the mounds may finally lead us.

His bibliography is intended for the beginner. The latter portion of it, corresponding to the "tour" section of the book, is arranged according to states. Virginia has not a single reference.

Here is a writer with style and feeling, with threads of very human philosophy running through the book, who has been in touch with much field excavation and who is passionately fond of his subject, but after reading the book thoroughly we are left in almost as vague a fairyland as before. We doubt if he realizes the enormous difficulties attending the writing of a clear-cut, oriented, true presentation of the whole situation. The book lacks the real foundation that ties all the details together. Mr. Shetrone is quite an authority on the subject, and has made a good attempt, but was not broad enough to produce a real textbook. It will be a good thing if some of the anthropologists of the country read him a little critically.

JOHN P. HARRINGTON.

Spindrift. By Florence Mary Bennett. *Poems and a Prose Epilogue.* Pp. 85. The Mosher Press, Portland, Me. 1930.

In this very attractive little volume, characteristic in the delicacy and distinction of its format and make-up of its publishers, Mrs. Anderson issues a number of new poems as well as several which have appeared before in various magazines, among them ART AND ARCHAEOLOGY. Always a lover of Greek, the author is at her best in her renderings of fragments from Alkman, Simonides and Euripides. The volume concludes with an Epilogue which is really a reversed prefatory study in apologetics.

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